ZOOARCHAEOLOGY AT THE COFFEY SITE (14PO1): MID-HOLOCENE ECONOMY ON THE PRAIRIE PLAINS

By

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ABSTRACT

The Coffey Site (14PO1) on the Prairie Plains border in northeastern Kansas has influenced theories on middle Holocene subsistence behavior since its excavation in the early 1970s, serving as a prime example of a broad-spectrum economy adapted to the rigors of the Hypsithermal Period. A reanalysis of the faunal assemblage from this important site reveals new aspects of behavior at Coffey through zooarchaeological methods not used in initial reporting of the site. This analysis suggests that while the economy made use of a number of faunal resources including fish, turtles, and possibly waterfowl, bison were a highly ranked and heavily utilized species. A broad-spectrum economy may therefore be somewhat overstated in relation to Coffey. Examination of site formation processes and taphonomy of bones sheds light on assemblage characteristics, and examination of cultural modification to bones reveals intense utilization of species such as deer and bison. Bison tooth wear and eruption analysis indicates occupations during summer and winter, in comparison with previous interpretations that placed occupation from spring through fall. Variability inherent in subsistence practices suggests that behaviors exhibited at Coffey are not necessarily appropriate for other groups throughout the Plains, or at other times during the middle Holocene.

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Chapter 1.

Introduction and Background

The field of archaeology is concerned with investigation of the archaeological record through excavation of sites and the recovery and documentation of information. This steady stream of documented collections often becomes backlogged and sometimes assemblages simply gather dust in museums or storage facilities, contributing nothing to our knowledge of past environments and populations' behaviors. Additionally, collections examined in the past were not subject to improved analytical methods and techniques devised in subsequent years. Even assemblages that have received considerable attention immediately after their excavation still hold valuable untapped information for understanding the archaeological record. Well curated museum collections such as from the Coffey site are therefore increasingly important.

The Coffey site (14PO1) represents a series of prehistoric components located in the Prairie Plains of northeastern Kansas, some 48 km north of Manhattan (Figure 1). The site is situated in alluvial deposits along a meander of the Big Blue River and has yielded surface artifacts including diagnostic Paleo-Indian projectile points as well as buried cultural deposits spanning the Middle Archaic to Late Woodland cultural periods (Schmits 1980).

The Coffey site was first recorded during a 1952 survey by Ralph Solecki and Mett Shippee. Testing of the site was conducted in 1957 for the proposed Tuttle Creek Reservoir by a Kansas University field party. This testing took place on a terrace above the Big Blue River and failed to find any artifacts below the plow zone (Schmits 1978). In 1970, a Tuttle Creek shoreline survey by a Kansas University crew conducted test excavations at Coffey, revealing three cultural strata representing an Archaic occupation. This was based on the presence of diagnostic projectile points (Schmits 1978). Kansas State University began full-scale excavation of the site in 1971, working on the site again the following year. Kansas University crews under the direction of Larry Schmits took over excavation from 1972-1975. The site has not seen any excavations subsequent to 1975.

Part of the Coffey site's significance lies in the regionally unique circumstances involving the recovery and study of Archaic period ecofacts and faunal evidence collected at the site. There are few documented sites in the Plains that contain mid-Holocene buried components and that have been systematically excavated with an attempt at collecting all possible faunal evidence. Coffey is one such site, and as a result it has featured prominently in comparative studies (e.g., Blackmar and Hofman 2006; Kay 1998). It has been cited in archaeological literature as an example of a diversified economy designed to exploit floodplain resources during the mid-Holocene Hypsithermal (Krause 1998: 70, Kay 1998: 178, Widga 2004). However, there have been many advances in the methodology used to interpret faunal evidence since Schmits' initial interpretations of the faunal evidence from Coffey. It is time, therefore, for a reexamination of the Coffey site by incorporating studies of taphonomy, natural and cultural modifications to bones, bison tooth eruption and wear, and a more thorough analysis of element representation for the bison and deer remains from the site. The present zooarchaeological study examines the degree to which large and medium-sized fauna such as bison and deer were a focal point of subsistence strategies at Coffey, and how these resources were utilized.

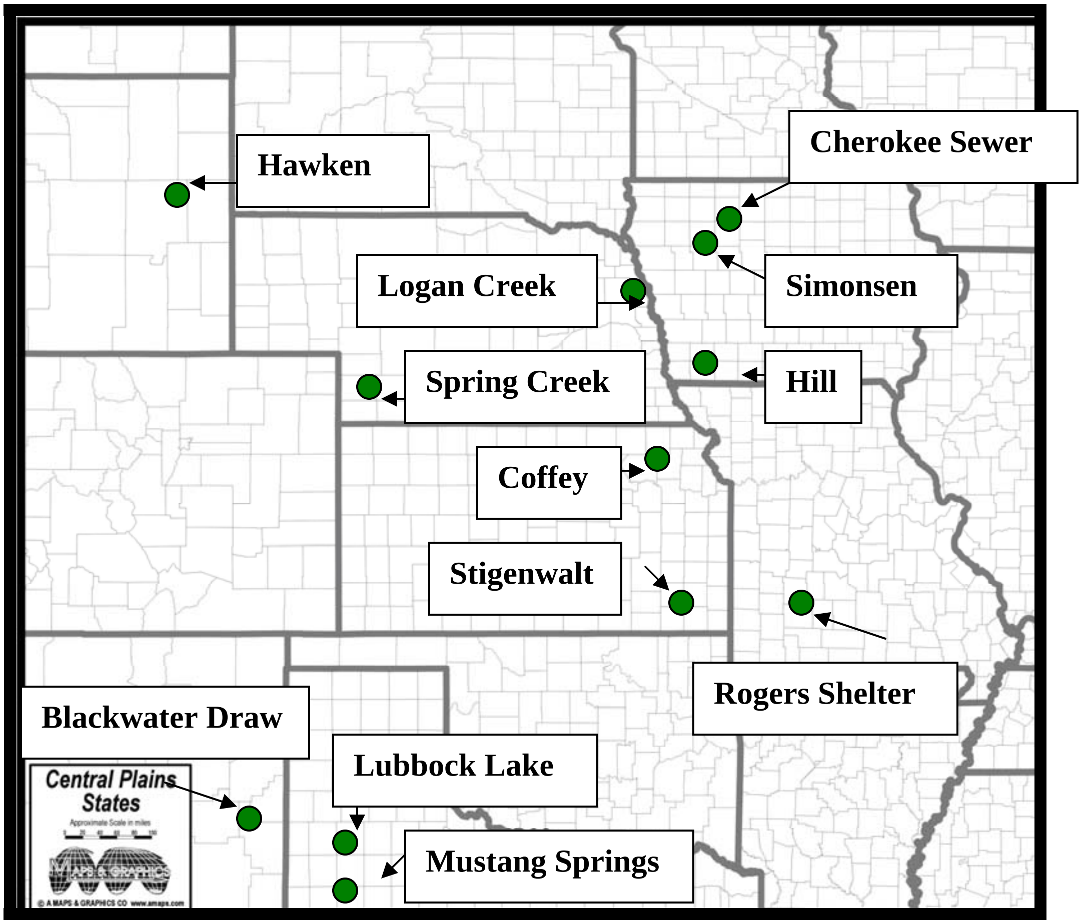

Figure 1: Central Plains with Middle Holocene Sites Containing Significant Faunal Assemblages

Chapter 2.

Implications of the Fluvial History and Depositional Environments for Interpreting the Faunal Assemblage at the Coffey Site

In order to fully assess the faunal assemblage from the Coffey Site, I explore the information that can be gleaned from geoarchaeological studies previously undertaken at the site. Because one of the goals of many zooarchaeological investigations involves reconstructing past environmental conditions, it is useful to enter into the study already knowing the basic geological processes that have formed the Coffey site. Fortunately, Larry Schmits (1980) completed a thorough study examining the fluvial history and stratigraphy of the Coffey site. This chapter outlines Schmits' main findings and assesses the implications of those findings on interpretations involving the faunal remains at the Coffey site.

As Schmits notes, it was evident during investigations that "the archaeological and sedimentological records [at Coffey] were directly interrelated" (1980: 79). Therefore, any examination of cultural material from the different levels of the site must take into account the geological processes that created the context of these levels.

Geomorphological and archaeological investigations have provided chronologies of valley alluviation, stream incision, and landscape stability in the Big Blue River valley for the late Quaternary. Three terraces have been identified in the valley; they are the T-3, T-2, and T-1 in order of decreasing elevation and age (Schmits et al, 1987). The T-3 terrace sits approximately 17-19 m above the modern floodplain and is mantled by 1-2 m of Loveland loess, suggesting that the underlying fill must be greater than 250,000 years old (Schmits et al, 1987). The T-3 surface has been relatively stable since late Wisconsinan time. The T-2 terrace is approximately 9-10 m above the modern floodplain, and is capped in many places by 1-2 m of loess (Schmits et al, 1987). The absolute age of the T-2 fill is unknown, but Paleoindian artifacts were recovered from the T-2 surface at the Coffey Site (Schmits 1980). The T-2 terrace has therefore been a stable surface throughout the Holocene. The T-1 terrace covers the majority of the valley floor and is approximately 3-4 m above the modern floodplain (Schmits et al, 1987). The T-1 terrace is a flat and poorly drained surface, and its fill contains a series of soils characterized by Bt horizons (Schmits et al, 1987). The stratified levels of the Coffey Site are contained in the fill underlying the T-1 surface.

Five major depositional units, referred to as Units I through V, have been identified at Coffey (Schmits 1980). Unit I is the T-2 terrace-fill with surface artifact scatters containing cultural materials associated with Folsom, Late Paleo-Indian or Early Archaic and other later Archaic cultures (Schmits 1980). Units II through V are facies of the Holocene floodplain formation that include the buried cultural levels pertinent to the present study. Specifically, Unit III contains the Middle Archaic cultural horizons that are the target of my faunal analysis. Therefore, I focus on the geological processes affecting this unit. Fourteen radiocarbon samples from this unit yielded ages ranging from 4840+/-95 to 5850+/-135 B.P. (Schmits 1980). Ten cultural levels have been defined in Unit III, each of which is separated by culturally sterile alluvial sediments. The depositional environment of this unit yields important information about the potential preservation of faunal material at the site.

Unit III is a channel fill inset against the truncated face of Unit II. That face would have been the cut-bank of an older channel fill. Hence, the sediments in Unit III comprise the fill of a paleo-channel that meandered and cut into the sediments of Unit II (Fig. 2). According to Schmits, this meander eventually was cut off from the main river channel, thereby forming an oxbow lake (1980: p.86). It is likelier that Unit III represents a simple paleochannel and not an

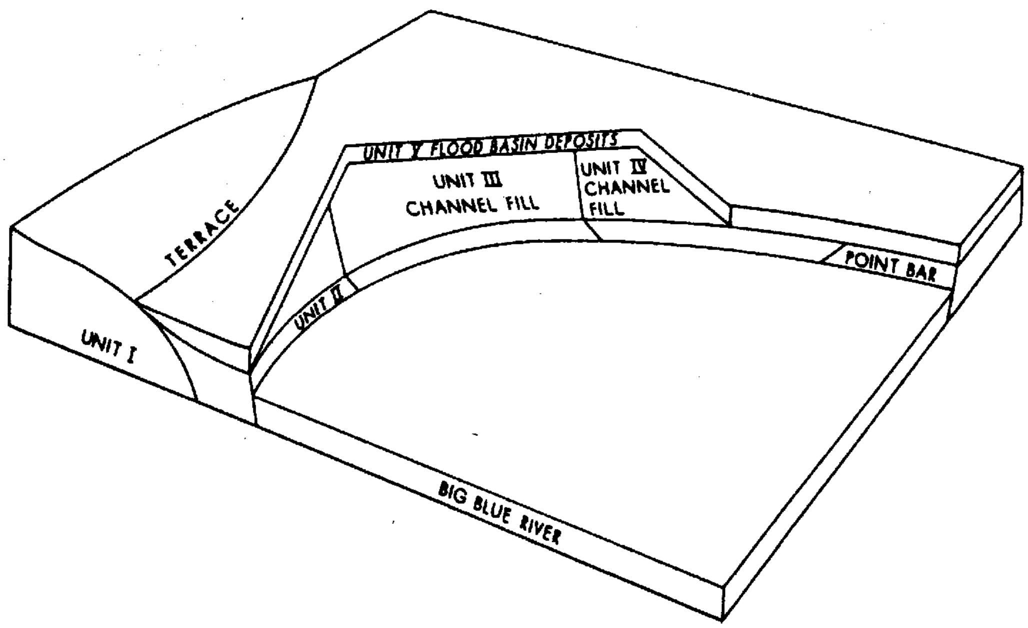

Figure 2: Block Diagram of Major Depositional Units at Coffey (From Schmits 1978)

oxbow lake. The Unit III sediments are predominantly fine grained silts and clays with smaller amounts of fine sand. The matrix color of the upper 1.2 m of Unit III is brown, whereas the lower sediments are a grayish-brown indicative of an oxygen deprived depositional environment. On the margins of the channel, the deposit is marked by thin weathered zones resulting from diagenesis of the sediments. The upper portion of the weathered zones consists of dark-brown or reddish-brown ferruginous bands resulting from periods of intense oxidation of the sediments. These ferruginous precipitates indicate the presence of water-dissolved compounds of divalent iron, and the bands and streaks present in the upper and lower sections of the unit represent a single period between two oxidation-reduction systems (Schmits 1980: pp. 86-87). This would have occurred as a result of a gradual lowering of the water table, and these structures are characteristic of formations that are seasonally soaked. Schmits interprets these data as evidence of cyclical episodes of drought that would have lowered the water levels of the oxbow lake, creating a surface for seasonal occupation of the margins of the lake. However, it is more likely that Unit III simply represents an abandoned channel that filled with water during the rainy season. During summer, fall, and winter, the abandoned channel would have served as a good campground because it was a low spot sheltered from wind, and riparian resources would be easily accessible.

Schmits (1980) measured some of the physical and chemical properties of sediments in each of the stratigraphic units at the site. These analyses included grain-size determination, pH, organic carbon content, and phosphate content. Generally, it was found that Unit III has low clay content, high silt content relative to other units at the site, roughly the same sand content as most of the other units, and contained relatively intact bedding (Schmits 1980). The pH of Unit III is slightly alkaline and the organic content is the lowest of the four stratigraphic units. Schmits also made use of multivariate statistical techniques to determine how significant the physical and chemical differences were between the various lithostratigraphic units at the Coffey site. Through this discriminant analysis, it was determined that there were three sedimentary facies at Coffey. These were defined as channel fill, floodbasin, and bank deposits. Unit III fit under the category of a channel-fill deposit according to its positive correlation with the other units at the site defined by this term. The discriminant analysis basically proved the similarities in physical and chemical characteristics of the three facies at the site, and confirmed the investigators' expectations of how units were deposited.

Schmits' analysis bears weight on a number of issues dealing with the interpretation of the faunal remains at Coffey. General integrity of the site can be inferred from the simple and

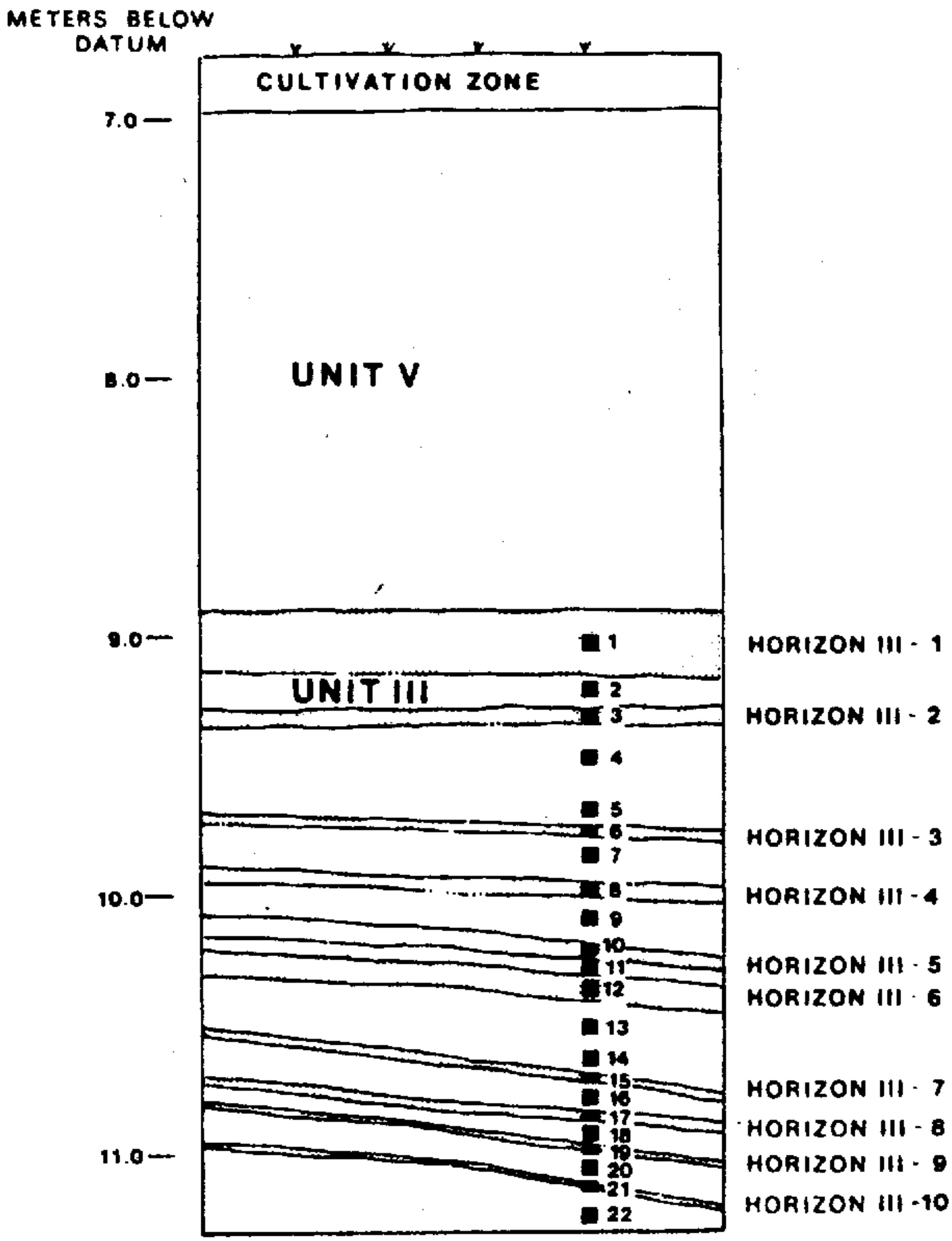

Figure 3: Stratigraphic Cross-section of Unit III horizons (From Schmits 1978)

regular mode of deposition, characterized by discrete cultural horizons separated by layers of sterile sediment.

It appears that the layers containing cultural material in Unit III for the most part represent relatively brief periods of occupation. Radiocarbon dates of 5163 B.P. for Horizon III-5, 5175 B.P. for Horizon III-7, and 5270 B.P. for Horizon III-8 (the three cultural horizons examined) show that these three occupations occurred within roughly a hundred years of each other. Periods of non-occupation are represented by sterile sediments, and point towards fairly regular deposition at least during this hundred-year period. This evidence points toward a brief snapshot in time for each occupation, providing the basis for statements on the nature of each occupation without concern for overlap in activities over a long period. The bedding structure of Unit III is relatively intact, suggesting that bones from this unit were probably found in much the same position as when they were originally buried by alluvium. The majority of the geological evidence points towards a clear picture of relative integrity for Unit III at Coffey.

Perhaps the most that can be inferred about the faunal remains from the geological processes at Coffey relate to taphonomic processes affecting the bones. Among the important processes that are considered within a taphonomic study are burial rate, depth, and sediment type; carnivore and rodent modification; duration of exposure between deposition and burial, and diagenetic processes. I address each of these processes to the extent to which they can be inferred from the geological data presented by Schmits. Then, examination of the degree of weathering on the bones themselves and evidence such as carnivore modification, root etching, etc., enables evaluation of the actual effect of taphonomic processes. Initial predictions regarding taphonomic effects are made based upon geological observations.

Schmits' geological study reveals the processes resulting in artifact burial at Coffey. The mode of deposition of sediments is of particular importance when assessing a faunal assemblage. As noted, Unit III at Coffey is interpreted as a channel-fill deposit. This low-energy depositional environment has significant implications for patterns of bone distribution. For example, Behrensmeyer (1975) notes that high-energy environments of fluvial deposition such as channels tend to have high ratios of teeth-to-vertebrae whereas low-energy environments such as lacustrine or channel fill settings tend to have low ratios. Unit III consists of fine-grained silts and clays that are characteristic of a low-energy fluvial depositional environment. This kind of depositional environment impacts the distribution and sorting of skeletal elements one might expect to find. For instance, Boaz (1982) notes that the lower the structural density and the greater the transport distance of a skeletal part, the lower the probability that the part will survive the rigors of fluvial transport. According to this observation, it would seem that there is a good probability that Coffey's faunal assemblage should contain a sizable number of bones that may not be particularly dense. These types of bones could include smaller and lighter bones such as those from fish, birds, and amphibians as well as the larger mammal bones commonly found at prehistoric sites. Bones that are easily abraded or broken, such as vertebrae, should be found in numbers more representative of their presence during deposition at a site resulting from a low-energy environment than a site resulting from a high-energy environment. Ordinarily, artifacts such as teeth or phalanges are present in higher numbers than vertebrae or ribs because of their durability. Coffey should therefore provide a more representative sample of the fauna that existed during the middle Holocene than a site formed in a high-energy environment.

The time between when a bone is deposited on the surface of the ground and when it is buried has a great effect on its preservation. Of course, it is possible that bones used by humans can be buried by them. However, this was likely not the case at Coffey, as evidence for pit features does not exist. It is therefore important to know rates of sedimentation to determine the potential duration for burial of bones. The suite of radiocarbon dates taken for the upper 1.7 m of Unit III suggests that the Middle Archaic cultural horizons were deposited from approximately 5270-5055 B.P., indicating a mean annual sedimentation rate of 0.79 cm (Schmits 1980). This rate points toward a fairly rapid process of sedimentation. Most bones would theoretically be buried in less than five years, and all but the largest bones would be buried within ten years.

Numerous experiments have been performed with the intent of measuring the influence of exposure duration of carcasses from the point of death to burial (Todd 1983, Gifford 1984, Brain 1981, Lyman and Fox 1989, Todd and Rapson 1999). A common finding among these studies is that there are many factors that cause differential weathering patterns. Several of the more important factors that affect the degree of weathering before burial include temperature, amount of sunlight, wind, and precipitation. These factors cannot be accounted for in the present study, and are difficult to control even in experiments.

Vegetation cover at Coffey during the mid-Holocene cannot be assumed, but seasonal soaking of Unit III sediments indicates that surface water was available at the site at least during portions of the year. Therefore the possibility for significant amounts of vegetation during or after occupation exists. Shade resulting from vegetation would have limited the effects of sunlight on weathering.

Deposition of sediments was probably due to periodic river flooding, and this probably occurred during the rainy season when the abandoned channel would not have been occupied. Short occupations of the site followed by periods of disuse suggest that bones would have been exposed long enough for scavengers to modify them. In addition, dogs were probably present with the human group during occupation of the site. A canid burial is recorded in horizon III-3, and one canid bone was recovered from horizon III-5. Carnivore modification may have affected the assemblage significantly. Bones at Coffey were exposed for a relatively brief period before they were buried, indicating that they probably suffered moderate to minimal amounts of weathering due to surface exposure, and were available to be modified by scavengers.

Another process integral to taphonomy that relies on geological information is that of diagenesis. This refers to the alteration of sediments after burial (Retallack 1990). Diagenesis of skeletal tissues is affected not only by intrinsic factors of the bones themselves, such as size, porosity, chemical structure, etc., but also by external factors such as sediment pH, water and temperature regimes, and bacterial action (Lyman 1994). In this regard, the data gathered by Schmits is particularly useful for the present study. As indicated earlier, pH levels for Unit III showed that the sediments were slightly alkaline in nature, ranging from 7.2-7.5 for the levels with which this study is concerned (Fig. 2). Chaplin (1971) notes that preservation of bone is better in basic sediments than in acidic sediments. However, bacterial action that destroys the organic fraction of skeletal tissue is somewhat inhibited by acidic environments. For the most part, the pH of the Unit III sediments at Coffey should be conducive to good preservation of bones because it is slightly basic.

Water and temperature regimes also play prominent roles in diagenesis at Coffey. Sillen (1989: 220) notes that the action of microorganisms such as fungi, which attacks the collagen in bones, is less pronounced in dry environments than in moist environments. The dry environment at Coffey during the Hypsithermal episode of the middle Holocene and the occupation of an abandoned channel during dry times of the year lead to the possibility that fungi and other microorganisms responsible for deterioration of bone were not especially active during deposition and burial of the Coffey bones. However, evidence of seasonal soaking of the channel indicates that there would have been moist conditions during parts of the year, with areas that were previously dry being inundated with water during the rainy season. It cannot be ruled out, however, that deposition occurred during the cool or cold season.

There is no visible evidence of significant pedogenesis in any of the sedimentary units concerned with the present study. Such changes within a forming soil have negative effects on the preservation of bones. Shrinking and swelling of clays is another factor that potentially affects bone preservation. Expanding clays are especially destructive at sites that are subject to regular periods of soaking and drying. Sediment samples were submitted for clay mineralogy examination to determine if the clays at Coffey are expansive. Results indicate that expanding clays did not have a significant effect on bone preservation. Overall, diagenetic factors appear to point towards relatively good preservation conditions in Unit III.

The information gleaned from geoarchaeological investigations at the Coffey site is of importance to present efforts in understanding the faunal assemblage of the site. Through geoarchaeological interpretations regarding site formation processes and taphonomy, we can begin to understand the integrity of the site, duration of exposure of bones before burial, burial processes, and processes dealing with diagenesis of the bones. Further investigation of the faunal remains can then lead to a greater understanding of the processes of site formation at Coffey, ultimately leading to a more complete picture of subsistence during the Middle Archaic period on the Plains.

Chapter 3.

Assemblage Summary: Samples and Data

The attempted recovery of all possible faunal remains via water screening from Coffey resulted in an extensive collection of specimens representing not only large mammals like bison and deer, but also small mammals, birds, reptiles, and fish (Figures 3-6, Table 1). Despite the relative abundance of small animal remains at Coffey when compared to faunal assemblages from other mid-Holocene sites, I focused on bison and deer in my zooarchaeological analysis for several reasons. First, there are portions of the assemblage cited by Schmits that are no longer a part of the curated collections available for this study. The diagnostic dorsal spines used by Schmits to identify and count the various fish species were not located by the author, making further analysis and interpretation of this important aspect of the site impossible. It is clear through the presence of bone fish hook tools and the presence of fish bones in hearth features that fish were an important species economically at Coffey. However, without the diagnostic spines any advanced interpretation of the fish remains would be speculative and inconclusive. Fish can also occur as background fauna in an abandoned channel that receives seasonal flooding.

Secondly, the presence of bird, amphibian, and reptile remains cannot be ruled out as non-cultural in origin. Small mammal, rodent, reptile, and amphibian remains lacked clear signs of cultural association, such as butchering or burning. Several bird bones from large species including geese were apparently used as tools, indicating that birds were being utilized economically. However, the majority of small animal species’ association with human occupation is debatable. Finally, bison and cervids have been economically important on the Plains throughout prehistory. Many comparative studies exist regarding procurement and use of these species over time and space. An analysis of bison and deer at Coffey can provide comparisons with mid-Holocene economies in other regions (e.g., Niven and Hill 1998) and on the Prairie Plains through time.

Table 1: Taxa Represented in the Coffey Site. All Species, NISP and MNI*
Bison and Deer counts made by the author. All other species counts from Schmits, 1978.

Class	Species	NISP	MNI
Large Mammal	*Bison bison* (Bison)	391	5
	Odicoileus sp. (Deer)	35	4
Small Mammal	*Procyon lotor* (Racoon)	11	2
	Mephitis mephitis (Striped skunk)	1	1
	Scalopus aquaticus (Eastern mole)	2	2
	Sylvilagus floridanus (Cottontail rabbit)	8	2
Rodent	*Neotoma floridana* (Eastern woodrat)	1	1
	Geomys bursarius (Plains pocket	3	1
	gopher)	1	1
	Spermophilus franklinii (Ground	2	2
	squirrel)		
	Sciurus sp. (Squirrel)		

Carnivore	*Canidae* usp. (Dog or coyote)	1	1
Avian	*Anas* sp. (Teal)	8	3
	Aythya sp. (Duck)	25	5
	Anas platyrhynchos (Mallard)	1	1
	Anser Albifrons (White-fronted goose)	6	1
	Branta Canadensis (Canada goose)	17	4
	Buteo sp. (Hawk)	40	2
Reptile	*Terrapene* sp. (Box turtle)	44	4
	Trionyx sp. (Soft-shelled turtle)	4	1
	Pituophis sp. (Bullsnake)	1	1
Amphibian	*Bufo cognatus* (Great plains toad)	29	1
	Bufo sp. (Toad)	2	1
	Rana pippins (Leopard frog)	2	1
Fish	*Ictarulus* sp. (Catfish or bullhead)	452	128
	Ictarulus punctatus (Channel catfish)	85	33
	Pylodictus olivaris (Flathead catfish)	1	1
	Aplodinotus grunniens (Freshwater	4	2
	drum)	2	1
	Lipisosteus sp. (Gar)	1	1
	Hyliopsis storeriana (Silver chub)	3	3
	Semotilus atromoculatus (Creek chub)	2	1
	Catostomus sp. (Sucker)	2	2

Family Cyprinidae (Minnows)

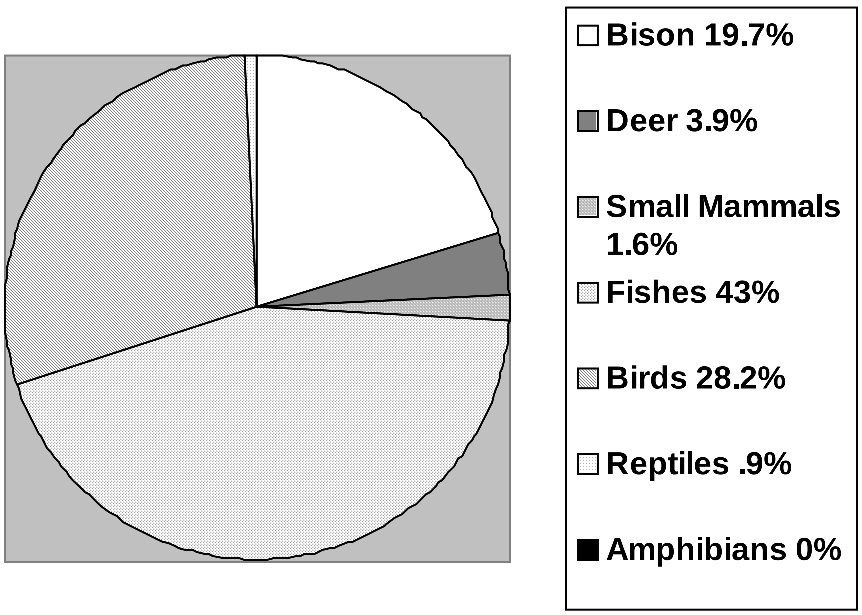

Figure 4: Species represented at the Coffey Site, Horizon III-5 (% of total NISP)
Bison and Deer counts made by the author. All other species counts from Schmits, 1978.

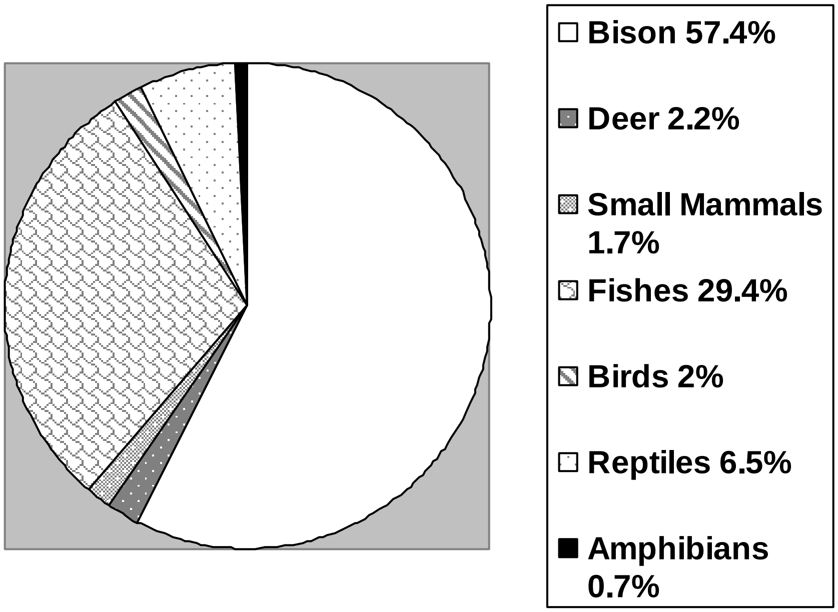

Figure 5: Species Represented at the Coffey Site, Horizon III-7 (% of total NISP)
Bison and Deer counts made by the author. All other species counts from Schmits, 1978.

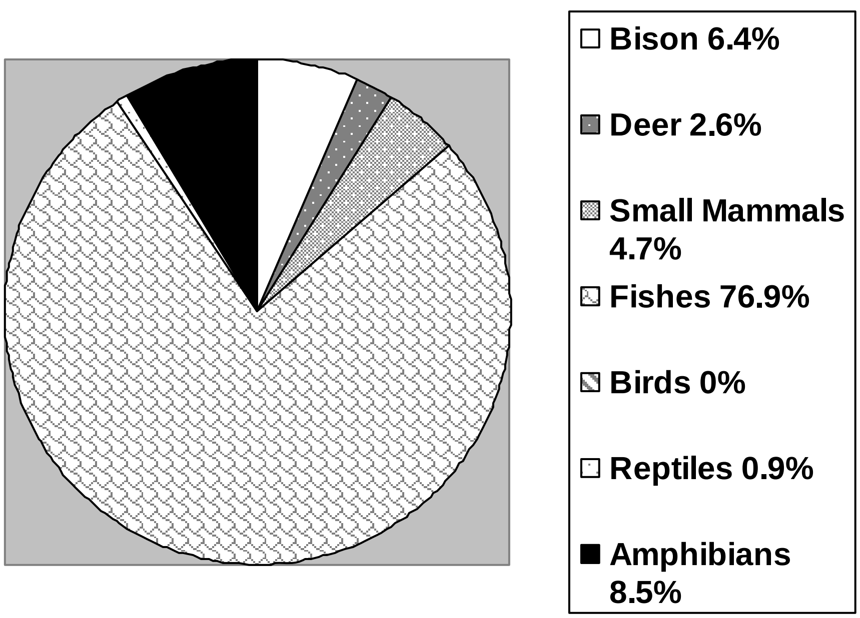

Figure 6: Species Represented at the Coffey Site, Horizon III-8 (% of total NISP)
Bison and Deer counts made by the author. All other species counts from Schmits, 1978.

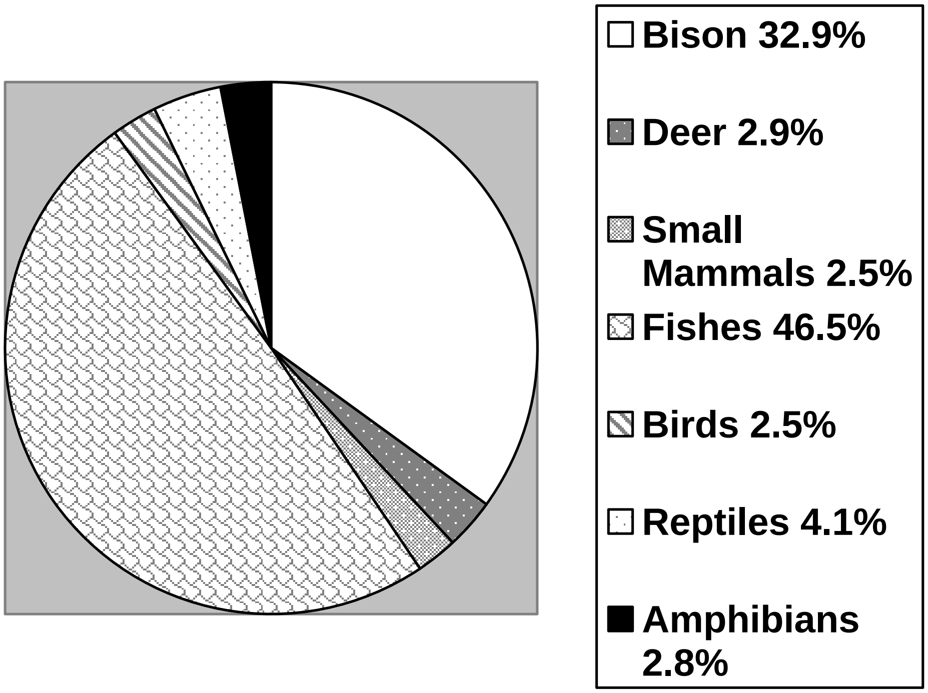

Figure 7: Species represented at the Coffey Site, All Archaic Levels (% of total NISP)
Bison and Deer counts made by the author. All other species counts from Schmits, 1978.

Faunal Assemblage Characteristics from Bison and Deer Remains

The analysis of the bison and deer remains employed the notation methods developed by Todd (1987) in his analysis of the Horner bison bonebed. Identifications of bison and deer bones included element, portion, and segment codes. In addition, bison and deer bones were measured and noted for breakage type, burning, presence of cutmarks, root etching, and carbonate coverage. These attributes were entered into a database that will be available for further studies of the site. Taphonomic observations noted directly from the bones generally confirmed predictions based on geological observations regarding site formation.

Chapter 4.

Element Representation (Bison)

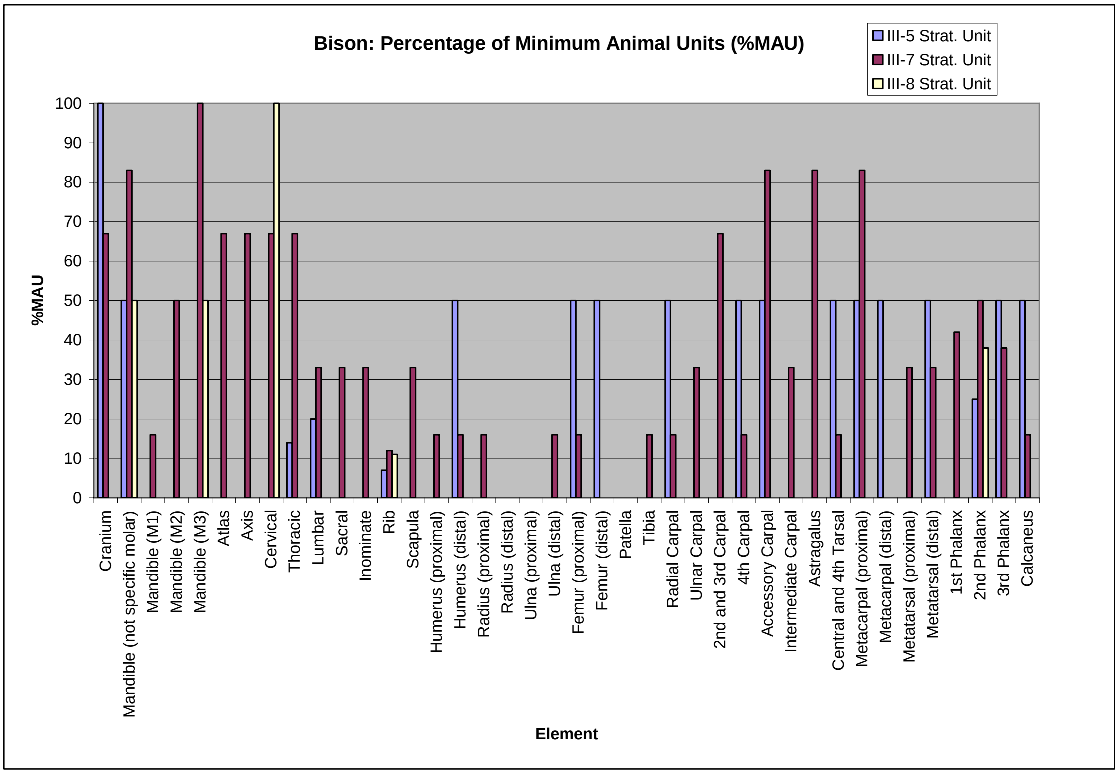

Figure 8: Bison Percentage of Minimum Animal Units

Horizon III-5

Bison remains from Horizon III-5 totaled 60 for number of individual specimens (NISP). The minimum number of individuals (MNI) was one based on sided elements. The bones from III-5 seem to represent a fairly complete individual, although one that had been thoroughly butchered and the bones processed for marrow. Bones from every meat-yielding section of the bison were recovered, but in varying proportions.

The most common of identified specimens came from a single set of mandibles. The mandible fragments did not, however, exhibit green bone breaks or impact fractures. They were likely not the subject of intense processing. One humerus fragment as well as two metacarpals and an assortment of carpals and phalanges indicate that both complete forelimbs were present at the site. This is supported by the presence of a right fourth carpal and a left metacarpal. Spiral fracturing of a humerus suggests that it was shattered for its marrow. The lack of identifiable radius or ulna bones may be attributable to heavy fragmentation during butchering and processing. Two fragments of a left femur, a left calcaneus, one metatarsal, and a fused left central and fourth tarsal provide evidence that at least the left hind limb was present at the site. Three cranial bones were identified, including one petrous (inner ear bone). In addition to the cranial bones, three bones from thoracic vertebrae, one centrum from a lumbar vertebra, and five rib fragments make up the axial elements found in this stratum.

The presence of appendicular bones as well as cranial, thoracic vertebrae, lumbar vertebrae, and ribs suggests that this animal was either killed very close to the site or units of meat were removed from the carcass at the kill site and the majority of the animal was brought back to the Coffey Site for use. Another possibility is that selection of the Coffey site as a camp resulted from killing a bison nearby or actually at the site location.

Horizon III-7

This horizon contained 309 NISP, and is thought to represent a minimum number of three bison. The MNI of three is projected based on three each of right proximal metacarpals, right astragali, right mandibular fourth premolars, right mandibular third molars, and left mandibular third molars. Tooth eruption and wear observations indicate that these bison were killed in different seasons, suggesting that individual kills were made and accumulated at the site over a number of episodes.

The greatest proportion of identified specimens from this level come from ribs, vertebrae, mandible fragments, and impact fractured long bones. This probably reflects the high degree of butchering for these elements. These elements exhibited a high number of cut marks, impact fractures and green breaks. However, other bones also were common, though they do not exhibit intensive processing. Phalanges, carpals, astragali, and sesamoids were, not surprisingly, the bones most commonly in complete and unbroken condition. The good condition of these bones probably is due to their density as well as their limited marrow (see Kreutzer 1992). Metacarpals and metatarsals were found in high proportions relative to their low general utility (Emerson 1993), but these bones were likely being used for their marrow as evidenced by green bone and impact fractures.

Evidence of hindlimbs from III-7 is in the form of low-utility tarsals, with long bones such as femorae and tibiae absent. There were five astragali from this level, and these bones provide an estimate of three for MNI. Three right astragali and two lefts indicate that for each individual bison, the entire hindlimbs were probably brought back to camp in order to take full advantage of the resources from these meat and marrow units. Surviving tarsals were rare when compared to carpals, but a number of factors may have contributed to this. Metatarsals were in a fragmented state, with roughly equal proportions of proximal and distal ends being present. These bones all exhibited green breaks and one distal end had cut marks on the tip of its articular surface. It is unclear why occupants at Coffey would remove phalanges from metatarsals. Metatarsals are less valued for their marrow content than other long bones, but they were probably being used for this purpose at Coffey.

Forelimb bones were highly shattered and incomplete, exhibiting green bone fractures. Six metacarpal bones representing at least three individuals (three from left, two from right, and one from an unsided metacarpal fragment) possess green fractures and one has a scorched area on the diaphysis (shaft). Metacarpals were apparently being used for their marrow. Only a few radius/ulna, humeri, and scapulae fragments were identified, despite the substantial nature of these bones. One medial portion of the distal end of a humerus appears to have canid bite marks. It is possible that the long bones were processed for their marrow at a nearby kill site, or that these bones were too heavily fragmented to be identified. At the Spring Creek site, front limb long bones were common, and were consistently transported to the site as a butchered, scapula-to-radius, anatomical unit (Widga 2004). It is clear that at least portions of five separate bison forelimbs were brought back to this campsite as indicated by five accessory carpals. However, processing of long bones is more intensive at Coffey than Spring Creek, as no complete long bones were recovered at Coffey.

Four fragments from scapulae were identified, one of which was an unfused glenoid, indicating a juvenile individual. Scapulae are thin bones that have a tendency to fragment easily, even if they were not utilized by people. Scapulae fragments from the Coffey Site did not exhibit impact fractures or green breaks. However, the NISP for scapulae is quite small and scapulae do have a relatively high caloric yield of fat present in bone grease, even if they do not have a high marrow content (Emerson 1993).

A large number of carpals managed to survive, probably because of their low utility and dense structure. Fused second and third carpals, as well as accessory carpals both counted three complete sided elements, contributing further evidence for an MNI of three. Fifteen bison cranial fragments were identified for Horizon III-7, but these were all small fragments or maxillary teeth. Like long bones from the site, there are no complete cranial specimens.

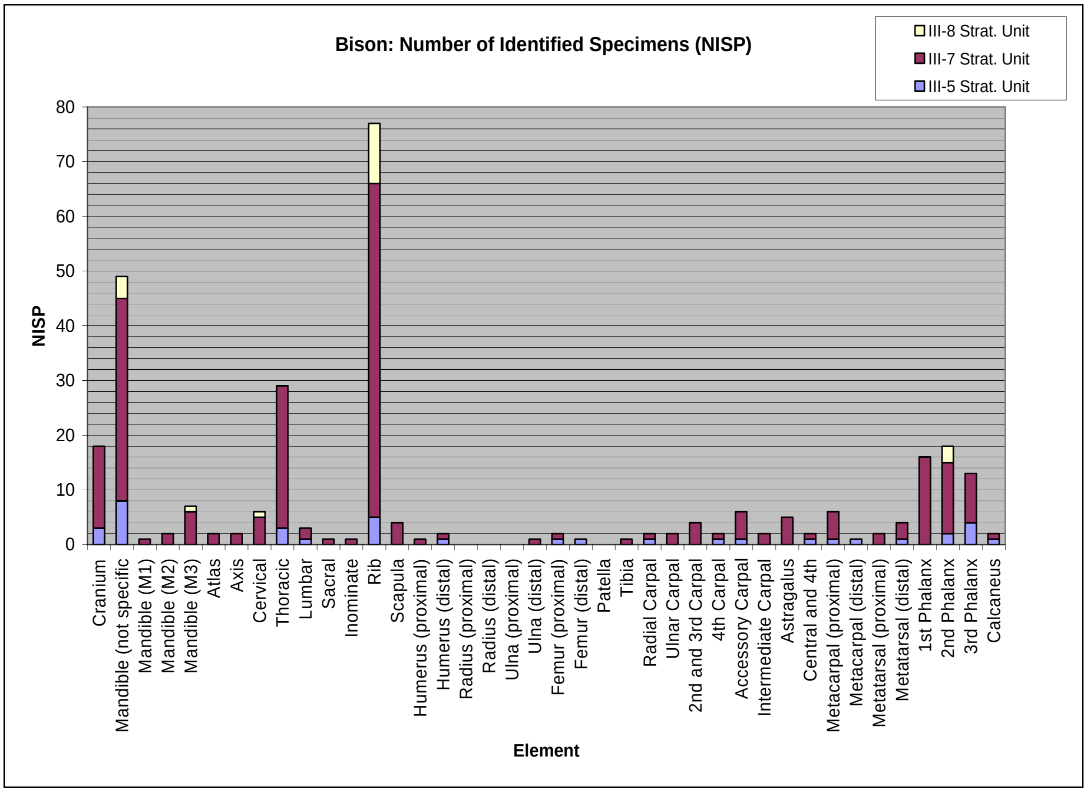

Figure 9: Bison Number of Identified Specimens

This makes it difficult to compare the size of the bison at Coffey with other known populations from prehistoric or modern bison. Fragments of the frontal portion of the skull and other unidentified skull fragments from Horizon III-7 suggest that at least one entire skull was present at the site. Two left maxillary P^2 teeth in partial wear and left molars in full wear suggest that three different skulls were represented at the site. Speth (1983) has demonstrated the use of brain tissue among Southern Plains prehistoric peoples. Given the high degree of use for bison at Coffey, the consumption of brain tissue by the inhabitants of Coffey is not unlikely. Two hyoid bones were recovered, one left and one right. One of these bones exhibits clear cut marks where butchers would have removed the muscles that attached the tongue from the hyoid bone.

Thirty-seven fragments from mandibles were identified, many of which display impact fractures, green bone breaks, cut marks, and scorched areas. Impact fractures are evident on the dentary ramus and horizontal ramus for several of the mandible fragments, indicating that they were likely being utilized for marrow under the molar cavity. Also, impact fractures were noted on an ascending ramus fragment and cutmarks were noted on another, indicating both smashing and cutting techniques possibly to remove mandibles from the cranium. Alternatively, cutmarks observed on the horizontal and dentary ramus could have served to cut the hide in order to skin the skull, a necessary task for splitting the skull to obtain brain tissue (Frison 1970: 11).

Post-cranial axial bones, which include vertebrae, ribs, pelvic bones, costal cartilage, and sternal bodies, were well represented in the faunal assemblage. There was an articulated vertebral column consisting of all the vertebrae from the atlas to the third thoracic vertebra. One cut mark was visible on the seventh cervical vertebra of this column. Such cut marks on vertebrae can result from the removal of high utility meat from the hump of the animal, or from removal of the long sinew which occurs there.

Including the articulated vertebral column and other isolated vertebrae, there were 26 identifiable thoracic vertebrae, though none of these were complete. Most were lacking portions of the spinous process, and many spine fragments are present. Four specimens of thoracic vertebrae were observed to have cut marks, and one of these specimens had an impact fracture. Cervical vertebrae were mostly represented by the full set of the articulated column, but there was also one separate seventh vertebra apart from the column. There were also two lumbar vertebrae centrums identified.

Inominate/sacrum bones were minimally represented, though there was one identified inominate fragment with possible cut marks. These bones may have been among the few bones that were selectively left where the animals were killed, at least for two of the carcasses. Clearly one of them was brought back and was present in a highly fragmented state. The low density of the inominate (Kreutzer 1992) is also a possible factor for the absence of identifiable fragments of these bones in the scenario that one or more of the bison were killed on the site location.

Ribs were well represented, at least in number of identifiable specimens (N=61). There were no fully complete ribs; most were blade fragments or complete proximal segments. There was a high degree of human modification to ribs. Five had been burned, while ten had cut marks. More than one third of the rib fragments (N=23) showed green breaks.

Phalanges were also well-represented in the assemblage. A greater proportion of phalanges were present when compared to minimum animal units than any other bones. None of the phalanges show signs of human modification, however, and the likelihood is that these bones are present in a complete state because of their denseness and low bone grease and marrow content. Phalanges were probably introduced to the site while still attached to the metapodials brought back for marrow processing.

Horizon III-8

This stratum contains the smallest number of identifiable specimens. Twenty-two specimens were identified with no redundancy in sided elements, making the MNI one. Most of the bones in this level were highly fragmented and in a more advanced weathering stage than the other levels. Three complete second phalanges were counted, indicating that at least several limb bones were brought back to camp. However, no long bone elements were identified. The most identifiable elements for this level were from mandibles and ribs. Two molars and premolars in full wear indicate at least one adult individual.

Figure 10: Cutmarks on Bison Hyoid

Cutmarks / Impact Fractures on Bison

Cutmarks were visible on a number of the bones in the present assemblage. Examination of the bison remains revealed that 39 out of 391 identified specimens contained cutmarks. This is 9.94% of all identified specimens. This can be compared with a total of 3.98% of bones exhibiting cutmarks in the Spring Creek bison assemblage (Widga 2004). The highest number of identified specimens exhibiting cutmarks came from level III-7, in which 11.32% of the bones displayed butchering marks. Level III-8 also had a relatively high proportion of bones with cutmarks; with 9.09%, although this came from a small sample size of only 22 bones. Level III-5 bison bones displayed the least amount of cutmarks, with only 3.33 % showing clear signs of cutmarks. These numbers should be qualified, however, in that thin films of sediment still remained on many specimens from all levels, and this could possibly obscure cutmarks. Additionally, this study did not make use of microscopy, and only counted cutmarks that were plainly visible to the unaided eye. However, most of the bones retained their cortical surfaces and root etching did not pose a problem with the identification of cutmarks.

Recognized cutmarks occurred on many skeletal parts, reflecting a combination of butchering and dismemberment. Cutmarked axial elements include cervical vertebrae, inominate, mandibles, hyoid, ribs, and thoracic vertebrae. Mandibles showed the greatest frequency, with marks most commonly located on the ventral surface of the horizontal ramus below the tooth row. Cutmarks in this location have been attributed to represent the cutting of holes in the hide for skinning (Frison 1970, p. 11). Cutmarked appendicular elements include a distal humerus from level III-5, distal ulna from III-5, proximal radius, scapula, and cutmarks on a distal metatarsal and ulnar carpal. Marks that appear on metacarpals or metatarsals have been interpreted by some researchers as evidence for cutting initial holes in the hide as part of the skinning process (Frison et al. 1976, p. 50). A number of cutmarks were also seen on unidentified long bone fragments. Although the majority of the bison and deer remains showed dry breakage, characterized by straight or angular fractures (Seebach 2002, p. 348), many specimens exhibited green bone breakage. This type of breakage is exemplified by helical or spiral fractures and is evidence that the bone was broken while still fresh.

Figure 11: Impact Fracture on Bison Mandible Fragment

Taphonomy

A number of factors affected the condition of the Coffey faunal assemblage. Among the factors not resulting from human actions include actions from rodents, carnivores, plants, aerial weathering, and geologic processes after deposition.

Bone weathering analysis was done in accordance with Behrensmeyer's system (1978). Only bison remains were examined for weathering in order to control for potentially different rates of weathering for deer and small animals. Each bone was not examined and marked as per weathering stage. Instead, the assemblage was examined in a general manner as to what the majority of bones exhibited. By and large, most bones did not appear to exceed stage two,

Table 2: Taphonomic Factors Affecting the Coffey Site Bison
Note: Some bones displayed more than one breakage type

Factor	Attribute	N	% of bison NISP
Breakage (III-5)	Green Intermediate Dry None	5 4 37 12	8.3 6.7 61.7 20.0
Carnivore/Rodent modification (III-5)	Carnivore	0	0
Breakage (III-7)	Green Intermediate Dry None	86 35 146 46	27.8 11.3 47.2 14.9
Carnivore/Rodent modification (III-7)	Carnivore	1	0
Breakage (III-8)	Green Intermediate Dry None	9 2 10 4	40.9 9.1 45.5 18.2
Carnivore/Rodent modification (III-8)	Carnivore	0	0

though bones from the oldest Archaic level (III-8) exhibited more weathering effects than the other two levels. This may indicate a greater amount of subaerial weathering as a result of periodic exposure to water from the nearby river or some other form of weathering. Cortical bones from level III-5, including a calcaneus, vertebrae, femur fragments, and metapodials, show a limited degree of surface weathering indicative of Behrensmeyer's stage 2. Compact bone
(articular ends) from this level, such as phalanges, carpals, etc., display some surface cracking but not a significant amount. Articular surfaces from larger bones such as metapodials display more cracks, but are still within the stage 2 range.

Cortical bones from level III-7 mostly appear to be stage 2, with limited surface weathering. When cracks are present in this level, they tend to be shallow. Mandibles show more cracks, but these bones were also heavily used by humans as evidenced by burning, impact fractures, etc. Compact bones from III-7 all display some degree of cracking. Some bones possess cracks on >50% of the surface area and would be categorized as stage 3 weathering. Bones from level III-8 showed more weathering than the other two levels. Cortical bone from long bone and rib fragments exhibits flaking and deep cracks, characteristic of stage 3 weathering. Compact bones fit stage 3 as well, as most of the bones display >50% surface cracking.

Direct observations of bone weathering generally confirmed expectations that the bones were not subjected to a long period of exposure to the elements. However, numerous bones with stage 3 weathering indicate that bones from level III-8 and some from III-7 were exposed long enough for factors such as sunlight and carnivores to have affected them significantly. Interestingly, root etching was generally not observed on the Coffey bison. This could be because there was a minimal amount of vegetation growing around the margins of the abandoned channel at the time of deposition, or it could be that plants on the channel margins were not calcium or nitrogen deprived and therefore did not seek these nutrients from the bone.

Carnivore Modification

As several researchers (e.g., Widga 2006, Haynes 1983, Walker and Frison 1982, Todd 1987) have shown, carnivores are commonly present in low numbers in Plains faunal assemblages. A possible dog burial found in horizon III-3 of the Coffey site containing a largely articulated canid skeleton implies that carnivores were present at 5140 BP according to radiocarbon dates from this level, roughly the same period as horizons III-5 and III-7, which have overlapping radiocarbon dates. Also, one canid bone was recovered from horizon III-5, proving the presence of these animals during occupation of one of the horizons under consideration. Carnivores therefore likely contributed to modification of the assemblage. A canine tooth from the canid burial in III-3 was observed to be broken off and then subsequently healed over. The intentional breaking off of canine teeth in camp dogs has been observed in late prehistoric sites such as the Vore site, apparently to serve the purpose of making dogs less dangerous (Reher and Frison 1980, Frison 1970: 25). Only one artifact from III-8 exhibited clear signs of carnivore gnawing (62048-42; a deer rib blade fragment). Given the small amount of recovered bones from this level, as well as the fragmented nature of the bones that were recovered and the presence of canids during this period, it is likely that other remains from the bison and deer from this stratum were also affected. One bone from Horizon III-7 displayed canid bite punctures (61006-15, the medial segment of the distal end of a bison femur). The lack of carnivore modification in III-5 suggests that canids were either absent from the human groups at Coffey or that carnivore-modified bones are subject to differential preservation or location of deposition than other bones (Lyman 1984; Munson and Garniewicz, 2002). Since only two bones from the entire assemblage were found to possess carnivore modification, it is probable that carnivore-modified bones undergo more rapid disintegration than bones not modified by carnivores, or that such bones, if present, occurred primarily in other areas of the site.

Chapter 5.

Element Representation (Deer)

Surprisingly, deer were underrepresented at the Coffey Site when compared to bison. Throughout the literature, Coffey is depicted as an example of a broad-spectrum economy. As such, one would expect deer to be utilized as much if not more than bison. It is clear that a wide range of resources was being explored at Coffey, including fish from the river as well as small mammals, birds, and possibly turtles. The inhabitants of the site were clearly not focused bison hunters in the manner of some Paleo-Indian groups such as Folsom. Indications point towards the bison remains from Horizon III-7 as representing opportunistic solitary kill events, not a mass-kill event. The site was occupied over a number of seasons. In such a circumstance, one might expect deer to be more numerous than bison, because deer have much smaller home ranges than bison and would have taken less effort to hunt for opportunistic hunters. Also, deer are generally overrepresented instead of underrepresented at sites as they can be easily transported relatively intact over short distances, unlike bison. There is the possibility that deer could have been over-hunted or depleted in a relatively short time, and so may not have been common in the site area during the periods of occupation.

There are 15 identified specimens of deer from Coffey that had no associated provenience information. Given that levels III-5, III-7, and III-8 each contained one right astragalus, and there was a right astragalus with no horizon provenience (but that contains an artifact number and was clearly from the Coffey site), it follows that the MNI for one of these levels is 2. Schmidts places the deer MNI for III-5 as two, although he has an NISP for this level as containing only 10 identified specimens. The current study puts the NISP for III-5 at 12. The deer MNI for all horizons together should be 4, although which horizon contains two deer is still in question. The MNI for deer from Horizon III-5 appears to be two; however this is equivocal because based upon the sided elements for deer in this level, there is conclusive evidence for only one deer. As noted, the MNI of two is based on Schmits' (1978) assessment of MNI for this level. Based on Schmits' data it is likely that at least the majority of these specimens came from III-5. Also, many of the deer bones from III-7, as well as the bison bones, were coated with carbonates. The deer bones without provenience do not display carbonate coatings, and although this does not conclusively prove they are from III-5, it is more evidence that suggests they are not from III-7.

Examination of the deer remains showed that only three of 33 NISP for all levels have cutmarks. One specimen from each level has cutmarks (9.09% for each level). Cutmarks were only recognized on rib blade fragments for deer.

Horizon III-5

The deer bones from III-5 represent at least one individual. Bones from forelimbs and hindlimbs are present, there are teeth, and one rib fragment shows signs of butchering. While several of the bones display indeterminate breaks, there are no clear signs of impact fractures or green bone breaks. However, none of the long bones commonly used for marrow extraction are in the assemblage. If they were processed for marrow, the impact flakes would be difficult to identify as deer. There were many small fragments of bones in the assemblage that were not identified because of inability to conclusively determine what animal they represented. Because some of these fragments were probably deer, this introduces a bias limiting the identified specimens of deer.

Horizon III-7

Deer element representation from this level resembles that from III-5. Astragali, carpals, teeth, and ribs are the common elements. There was one proximal (ancillary) portion of an ulna, but the break on this bone was deemed to be indeterminate rather than green. A cut mark was observed on a rib blade fragment. Again, green breaks were not observed, but there were few elements present that would serve as good sources for marrow. Carbonate coatings occur on several mandible fragments from this level.

Horizon III-8

III-8 deer remains include an astragalus, a left maxillary tooth row, several rib blade fragments, and a number of fragmented long bones. A distal portion of humerus and a distal portion of tibia display green breaks, indicating they were probably used for marrow extraction. All appendicular elements from this level were right sided. A rib blade fragment exhibited cut marks and burning, and the tooth row also appeared to have been burned. An unfused distal tibia epiphysis that articulates with a distal tibia diaphysis indicates that this individual was juvenile.

Deer remains with no provenience

Fifteen, (out of 48) or 31% of the deer specimens from the assemblage had no further provenience information. This limits the interpretation of the deer remains. Five of these specimens lacking provenience were second phalanges, two were first phalanges, and the remainder consisted of various teeth, a left ulnar carpal, a right astragalus, a rib head, and a right scapula glenoid.

Chapter 6.

Seasonality of the Coffey Site Occupation

Schmits (1978) characterized the occupation of Coffey as a series of short term seasonally-occupied base camps taking place possibly from March (early spring) through November (late fall). This interpretation is based on the presence of floral and faunal species with restricted seasons of availability as well as site suitability regarding flooding and/or availability of aquatic resources. The location of Coffey on the margins of an abandoned channel would seem to preclude occupation during much of the spring when flooding would have rendered the spot uninhabitable. According to Schmits, a winter occupation would also seem unlikely because aquatic resources would not be available and the site did not provide adequate cover from the cold in the absence of shelters, which were not documented. Schmits notes the presence of migratory birds as evidence pointing towards a spring or fall occupation; however charred seed remains from bullrush (Scirpus sp.) were found in Horizons III-7 and III-8 that would only have been available during the midsummer months. These attempts at ascertaining seasonality are useful yet problematic. Another method of estimating seasonality is through eruption and wear sequences for bison dentition.

Bison Tooth Eruption and Wear

Although most attempts for estimating bison age-at-death have involved the study of large sample sizes of complete mandibles from catastrophic mass-kill events

[Frison and Reher (1970), Reher and Frison (1980), Todd and Hofman (1987), Todd et al. (1996), Niven and Hill (1998)], it may be useful to compare the smaller number of bison mandibles from Coffey with already documented collections for which age-at-death has been determined. Mandibular third molars (M3s) were observed for eruption and wear sequences in order to determine seasonality and age at death. One right M3 from Horizon III-8, and 3 right M3s and 3 left M3s from Horizon III-7 were available for observation.

Horizon III-7

The six M3s from Horizon III-7 likely represent pairs of molars from three animals. One right M3 (specimen 62031) is from a mature animal probably 7+ years old (e.g., Todd 1991). All facets of this M3 are in full wear, with the hypoconulid in full wear and connected to facets 7 and 8 by a continuous enamel ring. The ectostylid is in wear but separated from the remainder of the tooth. No specific seasonal estimate was attempted for this specimen. Specimen 61025-25 is an M3 in a complete left mandibular tooth row that is likely from the same individual bison. The M3 in this tooth row is in full wear with wear on all facets including the hypoconulid. The enamel of the hypoconulid is connected with the rest of the tooth. The ectostylid is in wear, but not connected to the enamel rim of the molar. As with the similar right M3 specimen, no seasonal estimate has been made with this specimen.

Specimen 61023-4 exhibits wear on facets 1 and 2, but lacks wear on facets 3-8. Light damage, or possibly wear, occurs on facets 3 and 5. The hypoconulid has erupted above the alveolus but is unworn. The stage of wear on this molar compares very well with that of specimen 61050-18, a left M3 possibly from the same animal. The seasonality estimate for these two molars is approximately N+.3, with the age at death approximately 3.1 to 3.3 years old (considering possible wear beyond facets 1 and 2). This would indicate an estimated time of death during summer to late summer.

Specimen 61008-4 is an M3 that is part of a right mandibular tooth row. It exhibits wear on facets 1 through 6 with no wear evident on facets 7 or 8 or the hypoconulid. The hypoconulid is erupted just above the alveolus but is not in wear. The enamel on facets 1 and 2 are connected with facets 3 and 4, but enamel on facets 3 and 4 is not connected on the distal margin. The enamel on facets 5 and 6 shows light wear, and is not connected on the mesial (anterior) margin. The degree of wear compares with animals that died at ages N+.6 to N+.7 years from the birth pulse. This suggests a time of death during very late fall to early winter. No age at death was attempted for this specimen. Specimen 61045, a left M3, exhibits different wear than 61008-4, and may or may not be from the same individual. This molar is in full wear including the hypoconulid, and the occlusal surface is concave, indicating an older individual. The ectostylid is in wear but not connected to the enamel rim of the molar. The animal was probably more than 5 years old at the time of death. No seasonal estimate for this molar was attempted.

Two molars indicate a time of death during summer to late summer, while one molar indicates a time of death during very late fall to early winter. These observations suggest that the individual bison present in Horizon III-7 were almost certainly not killed at one time or during the same season. Coffey was a site for bison procurement during both summer as well as late fall to early winter. While Coffey may not have been a site of prolonged occupation, people were revisiting the area at different times of the year. Bison hunting was probably an opportunistic activity in which single animals were killed whenever a small herd was in the area.

Horizon III-8

The right M3 from III-8 exhibited wear on all facets, including the hypoconulid. Wear on the hypoconulid has exposed the entire enamel rim which is connected to the rest of the tooth. Comparative bison dentitions with this early stage of wear on the hypoconulid facets of the M3 represent N+.7 to N=.9 years. This individual would have been approximately 4.7 to 4.9 years old at the time of death. This molar indicates a kill season of early to late winter, assuming a birth pulse in the few weeks before and after May 1. This observation, along with seasonality estimates of molars from Horizon III-7, suggests that Coffey was being sporadically occupied from summer through winter. Based on bison age-at-death, it appears the only season the site was not occupied was from early spring through early summer.

Table 3: Measurements of Coffey Site Lower Dentition. *Indicates multiple parts of a single tooth row.

Catalog No.	Side	Element	Enamel Height (mm)	Ecto-Wear (mm)	Comments
61025-24	R	P4	4.0	n/a	No wear

61025-24	R	M1 or M2	3.4	n/a	Full wear, ectostylid connected
25297-25	L	IC	1.08	n/a	Full wear, far left incisor
61016-1	L	M1 or M2	5.68	.90	Full wear
61023-6	R	M1 or M2	1.75	n/a	Full wear, ectostylid connected
61093	L	MR TW	n/a	n/a	Tooth row from P2-M2 length 11.49
61093*	L	P2	.99	n/a	Full wear, part of 61093 tooth row
61093*	L	P3	1.6	n/a	Full wear, part of 61093 tooth row
61093*	L	P4	2.17	n/a	Full wear, part of 61093 tooth row
61093*	L	M1	2.07	n/a	Full wear, ectostylid connected, part of 61093 tooth row
61093*	L	M2	3.66	n/a	Full wear, ectostylid not connected but in wear, part of 61093 tooth row

61033-9	L	M1 or M2	3.43	n/a	Full wear, ectostylid connected
61045	L	M3	4.47	n/a	Full wear, ectostylid in wear, not connected, occlusal surface of tooth is concave
61050-18	L	M3	6.0 (broken)	2.47	Wear on 1st and 2nd facets only, ectostylid unworn
61025-25	L	MR TW	n/a	n/a	Tooth row from P2-M3, scorched, green bone fractures on bottom of mandible
61025-25*	L	P2	1.38	n/a	Full wear, part of 61025-25 tooth row
61025-25*	L	P3	1.83	n/a	Full wear, part of 61025-25 tooth row
61025-25*	L	M1	.43	n/a	Worn to the dentine, enamel remnant .43, part of 61025-25 tooth row
61025-25*	L	M2	2.03	n/a	Full wear, part of 61025-25 tooth row
61025-25*	L	M3	?	n/a	Full wear, ectostylid worn

					but not connected
61053-67	R	M1 or M2	4.88	.3	Occlusal surface battered, ectostylid unworn, tooth connected to 61001-125
25337	R	P4	2.07	n/a	Full wear
61044	R	P2	1.52	n/a	Not in wear
61044	R	P3	2.77	n/a	Partial wear
61044	R	IC	2.31	n/a	Light wear
61044	R	IC	n/a	n/a	Incisor tooth bud
61023-4	R	M3	?	n/a	Facet 1 and 2 in wear, rest unworn, wear compares to 61050-18, impact fractures on horizontal ramus
61023-2	R	M3	2.8	n/a	Full wear, ectostylid in wear, not connected, impact fractures and burning/scorching patch
1973-007	R	MR TW	n/a	n/a	Tooth row including P2, P3, P4, M2, M3: missing M1. Tooth row length 15.39
1973-007*	R	P2	1.48	n/a	Unworn, part of 1973-007

					tooth row
1973-007*	R	P3	2.75	n/a	Light wear, part of 1973-007 tooth row
61001-125*	R	P4	3.8	n/a	Very light wear, part of 1973-007 tooth row
61053-67*	R	M2	?	n/a	Full wear, part of 1973-007 tooth row
61002-4*	R	M3	?	n/a	Cusps 1-6 in wear, no wear on 7,8,9. impact fractures, part of 1973-007 tooth row
25142-Q	L	P4	3.37	n/a	Full wear
25155-Q	R	ML	4.79	.3	Full wear
25147-Q	L	P3	2.02	n/a	Full wear, green break
62031	R	M3	5.98	.8	Full wear

Table 4: Measurements of Coffey Site Upper Dentition. *Indicates multiple parts of a single tooth row.

Catalog No.	Side	Element	Enamel Height (mm)	Ecto-Wear (mm)	Comments
25245	L	ML	1.64	n/a	Full wear
61015	L	P2	2.95	n/a	Broken fragment, full wear on facets 1, 2

61068-20	L	MX TW M1-M3	n/a	n/a	Tooth row length 10.19
61068-20*	L	M1	3.83	n/a	M1 of maxillary tooth row, full wear, endostylid connected
61068-20*	L	M2	?	1.27	Full wear
61068-20*	L	M3	n/a	n/a	Erupted but unworn, very light wear on cusps 1, 3
61022	L	P2	4.67	n/a	Wear on 3rd and 4th facets

Chapter 7.

Discussion

Reconstructing middle Holocene subsistence behavior has been a challenging subject for researchers. First, there is a scarcity of archaeological data pertaining to this period as a result, at least in part, of geomorphic processes associated with the warm, dry conditions of the middle Holocene. Antevs formulated the idea of an Altithermal climatic episode characterized by severe aridity and droughts, and placed it within the middle Holocene (1948). More recent investigations use the term Hypsithermal (Deevey and Flint, 1957) when referring to the warm, dry period lasting from ca. 8500 B.P. to 4500 B.P. (Kay 1998). Geomorphic processes driven by warmer, drier conditions during the middle Holocene reduced the visibility of Archaic cultural deposits (Hurt 1967, Reeves 1973). Infrequent but heavy rainstorms caused erosion of sparsely vegetated hillslopes, removing sediments containing cultural material from small upland valleys and burying sites in large river valleys downstream (Bettis and Mandel 2002; Mandel 1992, 1995). Additionally, Archaic cultures of the middle Holocene have not received the same amount of research attention given to the Paleoindian cultures that preceded them or the much more visible Plains Village cultures that came later. Given these problems, debate on the nature of Holocene human subsistence behavior on the Plains is relatively poorly documented and consensus concerning these issues has not been reached by researchers.

Some early theories of human response to the Altithermal on the Plains focused on wholesale abandonment of the region (Husted 1970). Later theories have suggested that humans adapted to the increased aridity on the Plains by changing subsistence strategies to encompass a broader spectrum of resources compared to Paleoindian cultures (Frison 1975). Most sources citing Coffey use the site to justify the trend seen on the Central Plains from a strategy focusing primarily on bison towards a broadly based diet that utilized wild plants, waterfowl, fish, small mammals, etc. (Meltzer 1999; Widga 2004). While humans at Coffey were certainly making use of a variety of resources, the subsistence strategies employed at Coffey should not necessarily be viewed as indicative of human behavior throughout the Plains or throughout the middle Holocene. Attempts to overgeneralize climatic conditions or human behavior throughout the middle Holocene belie the variability that must have existed across the Plains for thousands of years.

The Middle Archaic occupations of Coffey represented in Units III-5, III-7, and III-8 span the period 5163-5270 14^{c} yr B.P., placing Coffey within the Hypsithermal climatic episode. However, chronometric values bounding the Hypsithermal, as well as periods within it when the middle Holocene was at its hottest and driest are still being revised. Benedict (1979) refers to two relatively short droughts from 7000-6500 B.P. and 6000-5500 B.P. in the Plains, separated by an increase in effective moisture from 6500-6000 B.P., with another peak in effective moisture occurring around 5200 BP. At Elk Lake, Minnesota, varved sediments also suggest a mesic interval from 5400 to 4800 B.P. (Dean et al. 1984). It is possible that people at Coffey may not have had to deal with as harsh and dry of an environment as was originally thought. Clearly there was enough surface water to sustain fishing as a valuable activity, and the more or less regular flooding that preserved artifacts at Coffey is evidence of significant moisture during this period. Coffey may have been a localized refugia, drawing hunter-gatherers to the spot at times when resources elsewhere were scarce. Sheehan has proposed a broad reshuffling of human settlements around water containing refugia (1994, p. 120), whereas others have theorized that previously significant populations on the Plains migrated onto adjacent areas that were more mesic, such as the Rocky Mountain Front Range (Benedict 1979).

Other areas on the Plains were clearly more arid and did not provide the kinds of resources available at Coffey. The southern Plains, including areas of Texas, New Mexico, Oklahoma, and Kansas, received significantly less precipitation and suffered more from drought than the Central and Northern Plains (Bamforth 1988, Meltzer 1999, Weeks and Gutentag 1988). The Lubbock Lake site in Texas contains cultural materials from the same period as Coffey, though the faunal remains from this site display evidence of a drier and harsher climate. Bison from Lubbock Lake exhibit heavy and irregular teeth wear due to excess grit on vegetation resulting from large amounts of dust in the air at the time (Johnson and Holliday 1986, p. 43). Also, the faunal remains from a stratum dating to 5500-5000 BP at Lubbock Lake are almost exclusively bison. An MNI of ten bison from this stratum, as well as no evidence of cultural modification to other animal bones, suggests that this assemblage represents a bison kill/processing event. This is in contrast to Coffey, where bison were an important facet of economy, but certainly not the only one. Evidence of response to dry conditions in the Southern Plains also comes from 20 wells dug to intersect a fallen water table at Blackwater Draw Locality 1 in New Mexico, and dozens of wells documented at Mustang Springs (Haynes 1975, Meltzer 1999). Burned rock roasting features containing remains of drought resistant plants such as prickly pear cactus, mesquite, and sotol also become prominent during the middle Holocene, as people were forced to supplement their diet with these preparation-intensive plants (Meltzer 1999). Few middle Holocene sites with significant faunal assemblages exist on the southern Plains, and while some see this as evidence that humans used this area sparingly during the Hypsithermal, it is possible that humans simply changed subsistence strategies to focus more on plant processing.

Other middle Holocene sites in the Central and Northern Plains do not generally exhibit the diversity of faunal remains recorded at Coffey. Economies at Logan Creek Complex sites dating to ca. 7200-6000 14^{c} yr BP were more acutely focused on bison. The assemblage at the Logan Creek site in northeastern Nebraska is heavily dominated by bison and represents processing of a series of multi-animal kills, as well as a horizon where four bison were killed individually, but still were the most important species economically (Widga 2006). While non-bison taxa are present at Logan Creek, their numbers are small and bison were the main focus of subsistence. Cherokee Sewer, a site containing projectile points similar to those found at Logan Creek, is a bison kill and processing site with a small amount of non-bison taxa.

The Spring Creek Site in southwestern Nebraska was originally thought to contain faunal diversity similar to Coffey (Meltzer 1999), but reanalysis of the assemblage suggests most of the non-bison specimens were either from surface contexts or a later occupation of the site (Widga 2003). Eighteen bison are present at Spring Creek, suggesting the main activity was involved in bison processing. At the Smilden-Rostberg, Hill, and Rustad sites, all in the Northern Plains, bison constitute the majority of specimens identified. However, these sites also yielded small amounts of non-bison taxa (Widga 2006). Rodgers Shelter in the western Missouri Ozarks, while not technically a Plains site, contains a long sequence of cultural occupation from the early Archaic to late Holocene. Small fauna such as prairie chicken, jackrabbit, spotted skunk and badger were increasingly utilized, while deer were found decreasingly during the middle Holocene Hypsithermal interval, and bison were also economically important (McMillan 1976). These trends represent the eastern expansion of the Prairie Peninsula across Missouri and Illinois (King 1980).

There are several possible explanations for the disparity between the assemblages of Coffey and other Plains Archaic sites. The good condition of bones at Coffey may partly explain the diversity of recovered faunal remains. Site formation processes particular to Coffey resulted in rapid burial and minimal harmful weathering to bone. Also, most of the sites mentioned were excavated before the use of water screening at a time when little attention was being paid to the collection and study of small faunal remains. Stringent attempts to recover all faunal materials from Coffey through the use of water screening made possible the recovery of small remains such as fish and bird bones, biasing Coffey's assemblage when compared to most other available collections.

Though it may be possible that underreporting of small fauna occurred during recovery at middle Holocene sites, the economic importance of bison during the middle Holocene is obvious. Fishing and utilization of birds and small mammals by people at Coffey helped to supplement the diet during certain seasons or times of environmental stress. The high degree of bison processing, including the use of metapodials for marrow and likely use of brain tissue, indicates that people wasted no part of this high-value resource. The relative scarcity of deer within the assemblage when compared with bison suggests that, like at Rodgers Shelter, deer were probably less numerous in the Coffey site area during the Middle Holocene.

Conclusions

Reanalysis of the Coffey site's faunal assemblage has shed new light on a number of issues, including seasonality, butchering practices, and subsistence strategies. Bison tooth eruption and wear observations indicate occupation of the site during summer as well as winter, and that individual bison were not killed at the same time or during the same season. This conclusion regarding seasonality differs from Schmits' theory of early spring through fall occupations. It also suggests that the site was occupied during the winter when riparian resources such as fish would not have been available for exploitation.

Evidence of intensive butchering and dismemberment of bison reveals a picture of opportunistic hunting and complete use of this species. The presence of axial elements at the site implies that bison were being killed either at or very near the site. In fact, a single bison kill may have been the reason for choosing the Coffey site as a camp. After meat removal and intensive processing of bones for marrow and grease, the area was probably occupied for a short time. Fishing took place at the nearby river during summer or fall occupations, while deer and some small fauna such as waterfowl and turtles were taken. Deer, however, were somewhat surprisingly under-represented. Periodic hunting in the area may have thinned out the deer population.

Subsistence behavior at Coffey was therefore diverse, yet still revolved around the occasional kill of large game such as bison. The amount of calories obtained from one bison would have exceeded the calories contained in all the small fauna recorded at the site, so to a certain extent the economy was still dependant on bison. It is important to remember that taphonomic observations at Coffey point towards good conditions for bone preservation. Other middle Holocene sites with environments less conducive to preservation may have once contained smaller fauna such as exists in the Coffey collection. Generalizations regarding Plains middle Holocene subsistence models based on Coffey's assemblage are therefore problematic and obscure the variability that must have existed throughout the Plains and during other times of the middle Holocene.

Further research relating to Coffey should involve a focus on the resources that supplemented bison in the economy. Relocating the diagnostic dorsal spines used to identify the fish remains would enable further analysis of this important resource, and an in-depth analysis of plant processing at the site is much needed in order to more fully understand subsistence strategies. Isotopic analysis of bison teeth would add to the understanding of bison herd variability. The value of reanalyzing important faunal assemblages such as the one from the Coffey site cannot be overstated.

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APPENDIX 1: MEASUREMENT AND DESCRIPTION OF FAUNA

SP# = Specimen Number
N = Grid North Designation
E = Grid East Designation
Z = Cultural Horizon
Level Depths (m Below Datum)
Class (BI = Bison, OD = Deer)
ELE = Element (see Todd, 1987)
POR = Portion (see Todd, 1987)
SEG = Segment (see Todd, 1987)
Mlen = Minimum Length (mm)
BRK = Breakage (D = Dry, G = Green, I = Indeterminate, N = None)
BRN? = Presence of Burning
CUT = Presence of Cutmarks
CAR = Presence of Carbonate Coverage

SP#	N	E	Z	Level Depths	Class	ELE	POR	SEG	Mlen (mm)	BRK	BRN?	CUT	CAR	Comments
25336-2	504	500	III-5		BI	CL	PR	CO	91.4	D	NO	NO	NO	LEFT, INCLUDES CALCANEAL TUBER
63039-59	509	501	III-5		BI	CPA	CO	CO	31.9	N	NO	NO	NO	
63012-106	507	502	III-5		BI	CPF	CO	CO	42	N	NO	NO	NO	RIGHT
63012-101	507	502	III-5		BI	CPR	CO	CO	30.5	N	NO	NO	NO	
25400	508	500	III-5		BI	CRN	SKO	FR	48.2	D	YES	NO	NO	
25432-2	512	504	III-5		BI	CRN	OCC	CO	121.8	D	YES	NO	NO	
63006-78	510	505	III-5		BI	CRN	PET?	CO	33.6	N	NO	NO	NO	PETROUS (INNER EAR BONE)
25340	502	500	III-5		BI	CS	CO	CO	65.4	D	NO	NO	NO	
63029-33	505	505	III-5		BI	FM	PR	CD	100.8	D	NO	NO	NO	TROCHANTIC FOSSA, >10 FRAGS, LOOKS JUVENILE
63054-85	507	506	III-5		BI	FM	DS	LT	86.8	D	NO	NO	NO	LEFT
66127-21	473	512	III-5	8.75-9.22	BI	HM	DS	ME	65.6	D	NO	YES	NO	>10 FRAGS
25471		502	III-5		BI	LB	SH	FR	70.8	G	NO	NO	NO	>10 FRAGS

63039-61	509	501	III-5		BI	LB	US	US	67	G	NO	NO	NO	
25217-1	504	500	III-5		BI	LB	US	US	58	G	NO	NO	NO	
25336-3	504	500	III-5		BI	LB	FR	US	54.5	G, I	NO	NO	NO	7 FRAGS
25432-1	512	504	III-5		BI	LB	US	US	73.1	I	NO	NO	NO	5 MAIN FRAGS
61031	504	504	III-5		BI	LM	CN	CO	94.5	D	NO	NO	NO	CENTRUM AND FRAGS
25446	504	502	III-5		BI	MC	DS	CO	84.7	D	NO	NO	NO	LEFT
63063-31	507	508	III-5	10.16-10.28	BI	MC	PR	CR	62.8	D	NO	NO	NO	LEFT, >5 FRAGS
63004-30	506	504	III-5		BI	MP	DS	FR	32.8	D	NO	NO	NO	3 FRAGS
25245	506	500	III-5		BI	MR	ML	EN	42.2	D	NO	NO	NO	LEFT
25334-4	506	500	III-5		BI	MR	EN	EN	24.3	D	NO	NO	NO	
25441	506	502	III-5		BI	MR	P2, P3	EN	56.2	D	YES	NO	NO	LEFT, >5 FRAGS
66009-67 to 99	493	505	III-5	9.29	BI	MR	TFR	EN	22.6	D	NO	NO	NO	33 FRAGS
25211	502	498	III-5		BI	MR	EN	FR	20	D	NO	NO	NO	5 FRAGS
63084	507	510	III-5	9.85-10.05	BI	MR	EN	FR	13.5	D	NO	NO	NO	
63005-628	510	504	III-5		BI	MR	EN	FR	14.9	D	NO	NO	NO	
25257	510	500	III-5		BI	MR	DRM	FR	54.5	I	NO	NO	NO	
1973-006	492	512	III-5	10.25	BI	MT	DSH	CO	98.8	D	NO	NO	NO	LEFT
25334-1	506	500	III-5		BI	PHS	CO	CO	51.2	N	NO	NO	NO	
63041-16	503	503	III-5		BI	PHS	CO	CO	59.9	N	NO	NO	NO	
63005-3	510	504	III-5		BI	PHT	PR	CO	49.1	D	NO	NO	NO	
63004-12	506	502	III-5		BI	PHT	CO	CO	69.7	D	NO	NO	NO	>5 FRAGS
63010	508	503	III-5		BI	PHT	CO	CO	85.1	N	NO	NO	NO	
25336-1	504	500	III-5		BI	PHT	CO	CO	84.6	N	NO	NO	NO	
63005	510	504	III-5		BI	RB	HE	CR	55	D	NO	NO	NO	MODERN CUT MARK

25217-4	504	500	III-5		BI	RB	PR	FR	29.4	D	NO	NO	NO	2 FRAGS
63004-20	506	502	III-5		BI	RB	PR	FR	40	D	NO	NO	NO	MODERN CUT MARK
66011-16	491	505	III-5	8.97-9.17	BI	RB	BL	FR	50.1	G	NO	NO	NO	
25337-25	508	500	III-5		BI	RB	BL	FR	75.7	I	NO	NO	NO	
63046-31	502	502	III-5		BI	SED	CO	CO	18	D	NO	NO	NO	
25334-2	506	500	III-5		BI	SED	CO	CO	31	N	NO	NO	NO	
63018-42	505	502	III-5		BI	SED	CO	CO	25.3	N	NO	NO	NO	
63009-27	504	503	III-5		BI	SEP	CO	CO	29.4	D	YES	NO	NO	
63019-20	506	502	III-5		BI	SEP	CO	CO	28.3	N	NO	NO	NO	
25414-1	502	500	III-5		BI	SEP	CO	CO	28.1	N	NO	NO	NO	
63039-58	509	501	III-5		BI	SEP	CO	CO	24.9	N	NO	NO	NO	
66208-3	465	512	III-5	8.91-9.12	BI	TFR	EN	EN	24.4	D	NO	NO	YES	WHITE PATINA
66127-20	473.8	513	III-5	9	BI	TFR	EN	EN	51.6	D	NO	NO	NO	BADLY DETERIORATED ENAMEL
25245	506	504	III-5		BI	TH	CNS	CO	82.3	D	NO	NO	NO	5 FRAGS
63058-54	507	507	III-5	10.13-10.34	BI	TH	CN	CO	59.5	D	NO	NO	NO	>10 FRAGS
63038-7	502	500	III-5		BI	TH	SP	FR	104.1	D	NO	NO	NO	
63063-30	507	508	III-5		BI	TRC	CO	CO	71.2	D	NO	NO	NO	LEFT
63002-53	508	505	III-5		BI	US	US	US	33.9	D	NO	NO	NO	
63012-103	507	502	III-5		BI	US	US	US	27.3	D	NO	NO	NO	
63012-104	507	502	III-5		BI	US	US	US	35.7	D	NO	NO	NO	
63039-60	509	501	III-5		BI	US	US	US	34.2	D	NO	NO	NO	
25217	504	500	III-5		BI	US	US	US	63.4		NO	NO	NO	
63019-2	506	502	III-5		BI	US	US	US	38.8		NO	NO	NO	
25334-3	506	500	III-5		BI	US	US	US	35.3		NO	NO	NO	
66016-58	491	510	III-5	9.04	OD	AS	ME	CO	37.6	D	NO	NO	NO	RIGHT
66044-48	490.8	509	III-5	9.06	OD	AS	CO	CO	44.5	N	NO	NO	NO	LEFT

25241	504	502	III-5		OD	MP	DS	CO	24.4	D	NO	NO	NO	>10 FRAGS
63019-1	506	502	III-5		OD	MP	DS	CO	55.1	I	NO	NO	NO	
63101			III-5		OD	MR	P3, P4	CO	15.5	D	YES	NO	NO	FROM F10
66127-20	473.8	513	III-5	9	OD	MR	EN	FR	41	D	NO	NO	NO	BADLY DETERIORATED ENAMEL
60410-12	413.4	368	III-5		OD	PHF	DS	CO	23.8	D	NO	NO	NO	
63032-114	511	503	III-5		OD	PHF	PR	CO	22.9	I	NO	NO	NO	
63018-36	505	502	III-5		OD	RB	BL	FR	51.8	D	YES	YES	NO	>10 FRAGS
66016	491	509	III-5	8.97-9.21	OD	SED	CO	CO	21	D	NO	NO	NO	
60410-15	413.4	368	III-5	9.4	OD	SEP	CO	CO	13.2	N	NO	NO	NO	
66016	491	509	III-5	8.97-9.21	OD	TRC	CO	CO	36.1	D	NO	NO	NO	LEFT
61063-43	502	503	III-7	10.56	BI	AS	CO	CO	90.8	D	NO	NO	NO	LEFT, MODERN CUT MARKS
61001-128	505	503	III-7		BI	AS	CO	CO	80.7	D	NO	NO	NO	LEFT
61010	508	502	III-7	302 CMBD	BI	AS	CO	CO	86.9	D	NO	NO	NO	RIGHT
66417-2	462	511	III-7	9.48	BI	AS	LT	FR	41.6	D	NO	NO	NO	>10 FRAGS, RIGHT
61085-10	501	502	III-7	10.60-10.75	BI	AS	CO	CO	84.8	N	NO	NO	NO	RIGHT
61083-4	500	498	III-7	10.65-10.72	BI	AT	LT	FR	78.8	D	NO	NO	NO	
1973-017	F5		III-7		BI	AT	CO	CO	128.2	D	NO	NO	NO	PART OF F5 VERT COLUMN
61020-17	511	505	III-7		BI	AX	CN	CO	105.6	D	NO	NO	NO	
1973-018	F5		III-7		BI	AX	CO	CO	80.5	D	NO	NO	NO	PART OF F5 VERT COLUMN
66413-16	463	516	III-7	9.08-9.36	BI	CE	CN	CD	88.3	D	NO	NO	YES	WHITE PATINA

1973-019	F5		III-7		BI	CE 3-4	CO	CO	210	D	NO	NO	NO	PART OF F5 VERT COLUMN
1973-020	F5		III-7		BI	CE 5-6	CO	CO	220	D	NO	NO	NO	PART OF F5 VERT COLUMN
1973-021	F5		III-7		BI	CE 6-7, TH 1	CNN	CO	270	D	NO	YES	NO	PART OF F5 VERT COLUMN, CUTMARK ON CE 7
61061-24	505	506	III-7	10.47-10.60	BI	CE 7	CO	CO	261	D	NO	NO	NO	7 FRAGS
61009-1	504	502	III-7		BI	CL	PRSH	ME	118.7	D	NO	NO	NO	RIGHT
61029-10	509	501	III-7		BI	CN	DSE	FR	40.5	D	NO	NO	NO	
61006-14	509	502	III-7		BI	CP	FR	CO	38.3	D	NO	NO	NO	
25318	510	498	III-7		BI	CPA	CO	CO	22.2	D	YES	NO	NO	
61022-8	512	504	III-7		BI	CPA	CO	CO	24.7	N	NO	NO	NO	LOOKS LIKE MODERN TROWEL CUTMARK
61012-93	504	503	III-7		BI	CPA	CO	CO	26.2	N	NO	NO	NO	
25379-33	504	500	III-7		BI	CPA	CO	CO	27.5	N	NO	NO	NO	
61001-136	505	503	III-7		BI	CPA	CO	CO	30	N	NO	NO	NO	
61006-7	509	502	III-7		BI	CPF	CO	CO	47.9	N	NO	NO	NO	RIGHT
61117-14	511	501	III-7	10.54	BI	CPI	CO	CO	39.4	D	NO	NO	NO	RIGHT
61000-11	506	502	III-7		BI	CPI	CO	CO	59.9	N	NO	NO	NO	LEFT
61000-10	506	502	III-7		BI	CPR	CO	CO	58.5	N	NO	NO	NO	LEFT
61622-19	512	504	III-7		BI	CPS	CO	CO	55.4	N	NO	NO	NO	LEFT
61012-108	504	503	III-7		BI	CPS	CO	CO	55.8	N	NO	NO	NO	LEFT
25297	510	498	III-7		BI	CPS	CO	CO	46.8	N	NO	NO	NO	RIGHT
61006-13	509	502	III-7		BI	CPS	CO	CO	53.1	N	NO	YES	NO	LEFT, MODERN CUT MARKS

25352			III-7		BI	CPU	CO	CO	48.8	D	YES	NO	NO	LEFT
61029-7	509	501	III-7		BI	CPU	CO	LT	51	D	NO	NO	NO	RIGHT
61023-5	510	503	III-7		BI	CRN	FN	FR	92.9	D	NO	NO	NO	
61068-20	507.5	508	III-7	10.44	BI	CRN	MX	M3-M1	122.2	D	NO	NO	NO	LEFT, M3-M1 TOOTH ROW
61021	510	504	III-7		BI	CRN	OCC	FR	73.3	D	NO	NO	NO	>10 FRAGS
61118-8	498	499	III-7	10.67-10.75	BI	CRN	FN	FR	62.4	D	NO	NO	NO	
61080-17	501	499	III-7	10.62-10.68	BI	CRN	FN	FR	49.6	D	NO	NO	NO	
61080-16	501	499	III-7	10.62-10.68	BI	CRN	FN	FR	45.3	D	NO	NO	NO	
61010-5	508	502	III-7		BI	CRN	FN	FR	44	D	NO	NO	NO	
25114-Q	2	14	III-7	300 CMBD	BI	CRN	SKO	FR	69.7	D	NO	NO	NO	>10 FRAGS
25342-9	502	498	III-7		BI	CRN	NSL	FR	85.2	D	NO	NO	NO	2 FRAGS
61031-56	504	504	III-7	10.40-10.60	BI	CRN	SKO	FR	47.6	D	NO	NO	NO	5 FRAGS
25337-1973-013	504	498	III-7		BI	CRN	SKO	FR	40.5	D	NO	NO	NO	2 FRAGS
61022	514	504	III-7		BI	CRN	MX	P2	61.5	D	NO	NO	NO	>10 FRAGS OF MAXILLA WITH 2ND PREMOLAR, LEFT
61019-1	511	504	III-7		BI	CRN	SKO	FR	36.9	D	NO	NO	NO	6 FRAGS
61043	510	507	III-7	10.31-10.51	BI	CRN	SKO	FR	47	D	NO	NO	NO	>5 FRAGS
61015	510	502	III-7		BI	CRN	P2	CO	41.2	D	NO	NO	NO	LEFT
61011-69	505	502	III-7		BI	CS	CO	CO	66.2	D	NO	NO	NO	
61029-11	509	501	III-7		BI	CS	CO	CO	114	N	YES	NO	NO	
25337	504	498	III-7		BI	FM	PR	ME	74.1	G	NO	NO	NO	LEFT

61006-15	509	502	III-7		BI	HM	DS	ME	84.4	G	NO	NO	NO	LEFT, CANID BITE MARKS
61075	502	499	III-7		BI	HM	PR	CO	70.3		NO	NO	NO	>10 FRAGS
25114-Q	2	14	III-7	300 CMBD	BI	HY	ANG	FR	53.3	D	NO	NO	NO	RIGHT, 3 FRAGS
61101-20	505	505	III-7	10.58	BI	HY	BDY	CO	43.5	D	NO	YES	NO	LEFT, 4 FRAGS
25297-25	510	498	III-7		BI	IC	CO	CO	24.6	N	NO	NO	NO	FAR LEFT INCISOR
25425-12	502	496	III-7		BI	IM	ICL	CO	141.3	I	NO	YES	NO	LEFT PORTION, POSSIBLE CUTMARKS
61073-109	502	502	III-7	10.64-10.74	BI	LB	SH	FR	39.1	D	NO	NO	NO	
61079-3	512	503	III-7		BI	LB	US	US	45.4	D	NO	NO	NO	
25338-2	506	498	III-7		BI	LB	US	FR	49.5	D	NO	YES	NO	
61089-32	501	501	III-7	10.61-10.65	BI	LB	SH	FR	46.3	G	YES	NO	NO	
61001-85	505	502	III-7		BI	LB	SH	FR	116.4	G	NO	NO	NO	
61063-39	502	503	III-7	10.56	BI	LB	SH	FR	53.7	G	NO	NO	NO	2 FRAGS
61029-8,9	509	501	III-7		BI	LB	SH	FR	76.9	G	NO	NO	NO	>5 FRAGS
25281-13	510	498	III-7		BI	LB	SH	FR	57.6	G	NO	NO	NO	IMPACT FRACTURE
25263-6	504	500	III-7		BI	LB	SH	FR	107	G	NO	NO	NO	
25454-46	504	500	III-7		BI	LB	SH	FR	66.6	G	NO	NO	NO	
25379-38	504	500	III-7		BI	LB	SH	FR	33.2	G	NO	NO	NO	
25384-16	510	500	III-7		BI	LB	FR	FR	39.3	G	NO	NO	NO	
61000-2	506	502	III-7		BI	LB	SH	FR	76.2	G	NO	NO	NO	
25337-24	504	498	III-7		BI	LB	SH	FR	39.9	G	NO	NO	NO	SPIRALLY FRACTURED
61009-3	504	502	III-7		BI	LB	US	US	75.8	G	NO	NO	NO	

6100 9-4	504	502	III -7		BI	LB	US	US	66. 9	G	NO	N O	N O	
6101 2-98	504	503	III -7		BI	LB	US	US	82. 2	G	NO	N O	N O	
6101 2-104	504	503	III -7		BI	LB	US	US	82. 7	G	NO	N O	N O	
6101 2-	102	504	III -7		BI	LB	US	US	49. 4	G	NO	N O	N O	2 FRAG S
6101 2-99	504	503	III -7		BI	LB	US	US	36. 9	G	NO	N O	N O	2 FRAG S
6110 7-122	500	503	III -7	10.72-10.83	BI	LB	FR	US	84. 7	G	NO	N O	N O	
6110 7-121	500	503	III -7	10.72-10.83	BI	LB	FR	US	65. 8	G	NO	N O	N O	
6100 6-12	509	502	III -7		BI	LB	US	US	57. 2	G	NO	N O	N O	
6102 4-5	511	503	III -7		BI	LB	US	US	68. 3	G	NO	N O	N O	
6101 8-11	512	505	III -7		BI	LB	SH	FR	89. 1	G	NO	Y ES	N O	
2528 5-28	504	500	III -7		BI	LB	SH	FR	46. 5	G	NO	Y ES	N O	ALSO INCL UDES 25285-31
1073-011	502	498	III -7		BI	LB	SH	FR	55. 1	G	NO	Y ES	N O	
1073-012	502	498	III -7		BI	LB	SH	FR	49. 2	G	NO	Y ES	N O	
6108 9-29	501	501	III -7	10.61-10.65	BI	LB	SH	FR	59. 7	I	NO	N O	N O	
6108 9-31	501	501	III -7	10.61-10.65	BI	LB	SH	FR	29. 6	I	NO	N O	N O	
6101 1-73	505	502	III -7		BI	LB	SH	FR	63. 4	I	NO	N O	N O	
6106 1-21	505	506	III -7	10.47-10.60	BI	LB	SH	FR	87. 1	I	NO	N O	N O	
6106 1-22	505	506	III -7	10.47-10.60	BI	LB	SH	FR	75. 3	I	NO	N O	N O	
6108 5-8	501	502	III -7	10.60-10.75	BI	LB	US	US	85. 6	I	NO	N O	N O	
6100 2-4	509	503	III -7		BI	LB	US	US	43. 5	I	NO	Y ES	N O	CUT MAR KS ON LONG BONE FRAG MENT S, >5 FRAG S
6108 9-27	501	501	III -7	10.61-10.65	BI	LB	SH	FR	35. 8	I	NO	N O	N O	
6103 1-36	504	504	III -7	10.40-10.60	BI	L M	CN	CO	77. 6	D	NO	N O	N O	>10 FRAG S
2509 3-Q	5.3	13. 8	III -7	298 CMB D	BI	L M	CN	FR	77. 5	D	NO	N O	N O	>10 FRAG S

6107 9-1	512	503	III -7		BI	M C	PR	CO	72. 8	D	NO	N O	N O	RIGH T, MOD ERN CUT MAR K
2529 7-50	510	498	III -7		BI	M C	PR SH	CO	90. 9	G	NO	N O	N O	RIGH T
6100 0-16	506	502	III -7		BI	M C	PS H	CO	13 7.8	G	NO	N O	N O	LEFT
6101 2-110	504	503	III -7		BI	M C	PR SH	CO	10 9.3	G	YE S	N O	N O	LEFT, SPIRA LLY FRAC TURE D, SCOR CHED AREA
6102 9-11	509	501	III -7		BI	M C	PR	CR	73. 4	G	YE S	N O	N O	RIGH T, MOD ERN CUT MAR K
2505 2-Q	5	9	III -7	290- 300 CMB D	BI	M C	SH	FR	75. 1	G	NO	N O	N O	MOD ERN CUT MAR K
2545 4-63	504	500	III -7		BI	M CF	CO	CO	21. 4	D	YE S	N O	N O	
6103 1-38	504	504	III -7	10.40- 10.60	BI	M P	DS	CO	65. 5	D	NO	N O	N O	3 FRAG S
2538 4-21	510	500	III -7		BI	M P	DS	CR	82. 8	D	NO	N O	N O	>10 FRAG S
2538 4-22	510	500	III -7		BI	M P	SH	FR	38. 5	D	NO	N O	N O	>10 FRAG S
6104 2	508	506	III -7	10.48- 10.62	BI	M P	DS	FR	38. 4	D	NO	N O	N O	
2538 4-46	510	500	III -7		BI	M P	DS	LT	90. 2	D	NO	N O	N O	8 FRAG S
2526 3-21	504	500	III -7		BI	M P	DF	CR	80. 6	G	NO	N O	N O	
2526 3-2	504	500	III -7		BI	M R	CO R	CO	77. 2	D	NO	N O	N O	RIGH T
6104 4	506	507	III -7	10.52	BI	M R	PM	CO	31. 7	D	NO	N O	N O	RIGH T P2, P3, INCIS OR, MAN DIBL E FRAG MENT S

6110 4-1	499	498	III -7	10.57-10.72	BI	M R	M2	CO	74. 6	D	NO	N O	N O	PART OF 61093 TOOT H ROW, LEFT
6101 4-25	506	505	III -7		BI	M R	IC	EN	17	D	NO	N O	N O	
6100 3-9	506	502	III -7		BI	M R	ML	EN	72. 1	D	NO	N O	N O	LEFT, M1 OR M2
6105 3-67	502	504	III -7	10.73-10.77	BI	M R	ML	CO	77. 4	D	NO	N O	N O	RIGH T, M1 OR M2 + MAN DIBL E FRAG S
2533 7	504	498	III -7		BI	M R	P4	EN	51. 5	D	NO	N O	N O	RIGH T
6102 3-6	510	503	III -7		BI	M R	ML	EN	32. 9	D	NO	N O	N O	RIGH T M1 OR M2
6105 0-18	507	506	III -7	10.48-10.6	BI	M R	M3	EN	63. 7	D	NO	N O	N O	LEFT
6102 5-24	511. 5	503	III -7		BI	M R	P4, ML	EN	41	D	NO	N O	N O	MOL AR, P4, AND MAN DIBL E FRAG S, RIGH T
6101 6-1	506. 4	504	III -7	10.56	BI	M R	ML	EN	63. 1	D	NO	N O	N O	>10 FRAG S, LEFT, M1 OR M2
6110 1-19	505	505	III -7	10.58	BI	M R	CO R	FR	65. 6	D	NO	N O	N O	MAN DIBU LAR NOTC H + 3 FRAG S

61006-8	509	502	III-7		BI	MR	RAM	FR	52.4	D	NO	NO	NO	RIGHT, CONDYLAR PROCESS, MODERN CUT MARKS
25384-11	510	500	III-7		BI	MR	BDR	FR	46.6	D	NO	NO	NO	
61003-5	506	502	III-7		BI	MR	RAQ	FR	65.7	D	NO	NO	NO	
1973-010	5	10	III-7	304 CMBD	BI	MR	SYM	FR	95	D	NO	NO	NO	7 FRAGS
61069	503	504	III-7	10.7-10.79	BI	MR	SYM	CO	90	D	NO	YES	NO	>10 FRAGS
61024-7	511	503	III-7		BI	MR	HRM	FR	66.5	D	NO	YES	NO	HIGHLY FRAGMENTED, >10 FRAGS
61005-130	513	504	III-7		BI	MR	BRD	FR	99	G	NO	NO	NO	
61050-12-16	507	506	III-7	10.48-10.6	BI	MR	FR	CO	44	G	NO	NO	NO	IMPACT FRACTURE
61025-25	511.5	503	III-7		BI	MR	TW	CO	252.1	G	YES	NO	NO	LEFT, GREEN BREAKS ON BOTTOM OF MANDIBLE
61060-41	503	503	III-7	10.71-10.78	BI	MR	RAM	FR	66.8	G	NO	NO	NO	
25290	506	500	III-7		BI	MR	DRM	FR	56	G	NO	NO	NO	5 FRAGS
61012-102	504	503	III-7		BI	MR	HRM	FR	51.4	G	NO	NO	NO	2 FRAGS
61060-43	503	503	III-7	10.71-10.78	BI	MR	RAM	FR	89.9	G	NO	YES	NO	IMPACT FRACTURE
61005-133	513	504	III-7		BI	MR	RAM	BUCCAL	140.4	G, D	NO	NO	NO	LEFT, >10 FRAGS

25263-1	504	500	III-7		BI	MR	BDR	FR	88.7	G, I	NO	NO	NO	INCLUDES 25263-3, 24,11, 15, 5, 13, 14, 31
61002-4	509	503	III-7		BI	MR	DRM	FR	158.6	G, I	NO	YES	NO	IMPACT FRACTURES ON BOTH SIDES, RIGHT, M3
61023-4	510	503	III-7		BI	MR	M3	CO	120.9	G, D	NO	YES	NO	INCLUDES RAM, 3 FRAGS, RIGHT, IMPACT FRACTURE
61093	500	497	III-7	10.59	BI	MR	TW	EN	168	I	NO	NO	NO	LEFT PARTIAL TOOTH ROW (P2-P4)
1973-007	509	503	III-7		BI	MR	TW	EN	67.7	I	NO	NO	NO	P2, P3, RIGHT, CONNECTS TO A61001-125
61012-101	504	503	III-7		BI	MR	BDR	FR	85.5	I	NO	NO	NO	
61006-9-11	509	502	III-7		BI	MR	COR	FR	57.8	I	NO	NO	NO	
25263-9	504	500	III-7		BI	MR	RAM	FR	77.4	I	NO	NO	NO	ALSO INCLUDES A25263-7
61001-125	509	503	III-7		BI	MR	DRM	P4	126.2	I	NO	NO	NO	P4, RIGHT, CONNECTS TO A1973-007

61023-2	510	503	III-7		BI	MR	HRM	M3	118.5	I	YES	YES	NO	2 FRAGS, RIGHT, IMPACT FRACTURES
61045	506	506	III-7	10.47-10.60	BI	MR	M3	EN	64.9		NO	NO	NO	LEFT M3 AND MANDIBLE FRAGS
25338-4	506	498	III-7		BI	MT	DS	FR	37.3	D	NO	NO	NO	
61067-26	503	505	III-7	10.61-10.72	BI	MT	PR	CO	68.1	G	NO	NO	NO	RIGHT, >10 FRAGS
25338-1	506	498	III-7		BI	MT	PR	CO	68.9	G	NO	NO	NO	RIGHT
61000-1	506	502	III-7		BI	MT	DSH	CO	172.3	G	YES	NO	NO	LEFT
61028-3	509	503	III-7		BI	MT	DSH	CO	99	G	NO	YES	NO	CUT MARKS ON TIP OF DISTAL ARTICULAR SURFACE
61029-2	509	501	III-7		BI	PHF	PR	AX	57.7	D	NO	NO	NO	
61022-12	512	504	III-7		BI	PHF	PR	CO	49.7	D	NO	NO	NO	
61060-46	503	503	III-7	10.71-10.78	BI	PHF	DS	CO	47.9	D	NO	NO	NO	
25384-7	510	500	III-7		BI	PHF	PR	CO	54.7	D	NO	NO	NO	LEFT
61067-25	503	505	III-7	10.61-10.72	BI	PHF	CO	CO	40.9	D	NO	NO	NO	LEFT, >10 FRAGS
61031-62-64	504	504	III-7	10.4-10.60	BI	PHF	PR	AX	34.4	D	NO	NO	NO	3 FRAGS, UNFUSED

25454-56	504	500	III-7		BI	PHF	CO	CO	71	G	NO	NO	NO	IMPACT FRACTURE, 2 FRAGS, F211
25384-5	510	500	III-7		BI	PHF	DS	CO	48.2	G	NO	NO	NO	LEFT
25384-15	510	500	III-7		BI	PHF	DS	CO	51.2	G	NO	NO	NO	RIGHT
61022-11,18,20	512	504	III-7		BI	PHF	DS	ME	48.7	G	NO	NO	NO	3 FRAGS
25384-12	510	500	III-7		BI	PHF	PR	CO	57.1	I	NO	NO	NO	RIGHT
25384-17	510	500	III-7		BI	PHF	PR	CO	52.7	I	NO	NO	NO	RIGHT
61070-1	501	497	III-7	10.52-10.72	BI	PHF	CO	CO	83.6	N	NO	NO	NO	RIGHT
61065-19	502	501	III-7	10.56-10.66	BI	PHF	CO	CO	83.2	N	NO	NO	NO	SIMILAR TUBEROSITY AS 61070-1
61090-2	510	500	III-7	10.61-10.68	BI	PHF	CO	CO	79.9	N	NO	NO	NO	
25425-11	502	496	III-7		BI	PHF	CO	CO	83.4	N	NO	NO	NO	RIGHT
61031-44	504	504	III-7	10.40-10.60	BI	PHS	DS	CA	38.5	D	NO	NO	NO	
61085-11	501	502	III-7	10.60-10.75	BI	PHS	CO	CO	60.7	D	NO	NO	NO	
61022-14	512	504	III-7		BI	PHS	CO	CO	53.9	D	NO	NO	NO	
61085-12	501	502	III-7	10.60-10.75	BI	PHS	CO	CO	53.7	D	NO	NO	NO	
1973-014	504	504	III-7	10.40-10.60	BI	PHS	PR	CO	38.3	D	NO	NO	NO	
61101-18	505	505	III-7	10.58	BI	PHS	CO	CO	53.7	D	NO	NO	NO	
61031-39	504	504	III-7	10.40-10.60	BI	PHS	DS	CR	42.2	D	NO	NO	NO	
61012-109	504	503	III-7		BI	PHS	DSE	CO	56.8	I	NO	NO	NO	
61071-B	501	498	III-7	10.63-10.71	BI	PHS	CO	CO	58	N	NO	NO	NO	
61010-21	508	502	III-7		BI	PHS	CO	CO	55.5	N	NO	NO	NO	
25384-2	510	500	III-7		BI	PHS	CO	CO	54.1	N	NO	NO	NO	
25384-6	510	500	III-7		BI	PHS	CO	CO	48.5	N	NO	NO	NO	
61001-103	505	503	III-7		BI	PHS	CO	CO	51.7	N	NO	NO	NO	
61079-2	512	503	III-7		BI	PHT	CO	CO	75.8	D	NO	NO	NO	

61032	506	503	III-7	10.6-10.69	BI	PHT	CO	CO	60.3	D	NO	NO	NO	ALSO INCLUDES A61032-22 (FRAG)
61067-27	503	505	III-7	10.61-10.72	BI	PHT	CO	CO	80.2	D	NO	NO	NO	
61003-4	506	502	III-7		BI	PHT	PR	CO	61.8	D	NO	NO	NO	
61007-1, 2	508	503	III-7		BI	PHT	CO	CO	21.8	D	NO	NO	NO	>10 FRAGS
61027-4	508	500	III-7		BI	PHT	CO	CO	89	N	NO	NO	NO	
61009-141	504	502	III-7		BI	PHT	CO	CO	82.5	N	NO	NO	NO	
61012-107	504	503	III-7		BI	PHT	CO	CO	78.7	N	NO	NO	NO	
61063-40	502	503	III-7	10.56	BI	PHT	CO	CO	83.2	N	NO	NO	NO	
25384-1	510	500	III-7		BI	PHT	CO	CO	79.6	N	NO	NO	NO	
61012-105	504	503	III-7		BI	RB	PR	CO	59.5	D	NO	NO	NO	
61109-12			III-7		BI	RB	PR	CO	40.7	D	YES	NO	NO	FROM F207
25263-4	504	500	III-7		BI	RB	PR	CO	42.6	D	NO	NO	NO	
25384-3	510	500	III-7		BI	RB	PR	CO	50.3	D	NO	NO	NO	
61001-124	505	503	III-7		BI	RB	BL	DS	95.7	D	NO	NO	NO	>10 FRAGS
61077- 6-13	504	505	III-7	10.58-10.68	BI	RB	BL	FR	59	D	NO	NO	NO	7 FRAGS
61110-25	509	505	III-7	10.43-10.51	BI	RB	BL	FR	64.1	D	NO	NO	NO	>10 FRAGS
61090-3,4	510	500	III-7	10.61-10.68	BI	RB	BL	FR	74.3	D	NO	NO	NO	
61100-12	501	503	III-7	10.65-10.81	BI	RB	BL	FR	87.7	D	NO	NO	NO	
61107	500	503	III-7	10.72-10.86	BI	RB	BL	FR	53.6	D	NO	NO	NO	>10 FRAGS
61081-2	503	498	III-7	10.53	BI	RB	PR	FR	54.5	D	NO	NO	NO	
25274-1	508	498	III-7		BI	RB	BL	FR	66.7	D	NO	NO	NO	
25384-4	510	500	III-7		BI	RB	BL	FR	120.9	D	NO	NO	NO	
25384-45	510	500	III-7		BI	RB	BL	FR	127.7	D	NO	NO	NO	
61001-123	505	503	III-7		BI	RB	BL	FR	105.6	D	NO	NO	NO	
61001-123	505	503	III-7		BI	RB	BL	FR	44.2	D	NO	NO	NO	
61025-19	511.5	503	III-7	10.47	BI	RB	BL	FR	82.2	D	NO	NO	NO	
61025-20	511.5	503	III-7	10.47	BI	RB	BL	FR	87	D	NO	NO	NO	

61025-21	511.5	503	III-7	10.47	BI	RB	BL	FR	57.1	D	NO	NO	NO	
61025-21	511.5	503	III-7	10.47	BI	RB	BL	FR	71.6	D	NO	NO	NO	>10 FRAGS
61025-22	511.5	503	III-7	10.47	BI	RB	BL	FR	93.2	D	NO	NO	NO	>10 FRAGS
25384-43	510	500	III-7		BI	RB	BL	FR	60.3	D	NO	NO	NO	>10 FRAGS
61002-3	509	503	III-7		BI	RB	BL	FR	108.9	D	NO	YES	NO	TRANSVERSE CUT MARKS ON RIB BLADES, >10 FRAGS
61024-8	511.15-511.43	503	III-7	10.43	BI	RB	BL	FR	63.7	D	NO	YES	NO	>10 FRAGS
61000-8	506	502	III-7		BI	RB	DS	FR	59.1	D	NO	YES	NO	TRANSVERSE CUT MARKS
61034-6	509	504	III-7	10.45-10.53	BI	RB	BL	FR	99.7	D	YES	YES	NO	5 FRAGS
25425-13	502	498	III-7		BI	RB	BL	FR	69.5	D, I	NO	NO	NO	>10 FRAGS
61018-1	512	505	III-7		BI	RB	BL	FR	70.5	G	NO	NO	NO	
61012-100	504	503	III-7		BI	RB	BL	FR	85.5	G	NO	NO	NO	
61012-97	504	503	III-7		BI	RB	BL	FR	51.9	G	NO	NO	NO	
61081-1	503	498	III-7	10.53	BI	RB	SH	FR	83.3	G	NO	NO	NO	
61081-3	503	498	III-7	10.53	BI	RB	SH	FR	74	G	NO	NO	NO	
61011-72	505	502	III-7		BI	RB	BL	FR	97.4	G	NO	NO	NO	
61011-77	505	502	III-7		BI	RB	BL	FR	41.2	G	YES	NO	NO	
61011-76	505	502	III-7		BI	RB	BL	FR	38.4	G	YES	NO	NO	
61011-66	505	502	III-7		BI	RB	BL	FR	48.2	G	NO	NO	NO	5 FRAGS
61010-4	508	502	III-7		BI	RB	BL	FR	65.3	G	NO	NO	NO	6 FRAGS
25281-14	510	498	III-7		BI	RB	BL	FR	59	G	NO	NO	NO	

25263-10	504	500	III-7		BI	RB	BL	FR	45	G	NO	NO	NO	
25333-2	502	496	III-7		BI	RB	BL	FR	44.6	G	YES	NO	NO	
25333-1	502	496	III-7		BI	RB	BL	FR	59.1	G	NO	NO	NO	
25142-Q	5	11	III-7	300 CMBD	BI	RB	BL	FR	98.5	G	NO	NO	NO	
61000-18	506	502	III-7		BI	RB	BL	FR	61.4	G	NO	NO	NO	
25261-6	502	498	III-7		BI	RB	BL	FR	89.7	G	NO	NO	NO	
61017	510	505	III-7		BI	RB	BL	FR	100.6	G	NO	NO	NO	>10 FRAGS
61033-17	502	500	III-7	10.60-10.69	BI	RB	PR	CO	81.2	G	NO	YES	NO	
61000-9	506	502	III-7		BI	RB	PSH	CO	134.7	G	NO	YES	NO	
61060-42	503	503	III-7	10.71-10.78	BI	RB	BL	FR	74.9	G	NO	YES	NO	
61060-44	503	503	III-7	10.71-10.78	BI	RB	BL	FR	78.8	G	NO	YES	NO	
61072-110	502	502	III-7	10.64-10.74	BI	RB	PR	FR	42.9	G, D	NO	YES	NO	
61009-2	504	502	III-7		BI	RB	DSH	CO	122.7	I	NO	NO	NO	
61060-45	503	503	III-7	10.71-10.78	BI	RB	PR	CO	49.5	I	NO	NO	NO	
25454-50	504	500	III-7		BI	RB	PR	CO	63.5	I	NO	NO	NO	LEFT
61012-103	504	503	III-7		BI	RB	BL	FR	65.3	I	NO	NO	NO	2 FRAGS
61001-104	505	503	III-7		BI	RB	BL	FR	59.2	I	NO	NO	NO	
61106	500	503	III-7	10.72-10.83	BI	RB	BL	FR	38.6	I	NO	NO	NO	>10 FRAGS
25337-21	504	498	III-7		BI	RB	BL	FR	55.2	I	NO	NO	NO	
25281-10	510	498	III-7		BI	RB	BL	FR	52.7	I	NO	YES	NO	
25454-49	504	500	III-7		BI	RB	BL	FR	55	N	NO	NO	NO	F211
25454-44	504	500	III-7		BI	RB	BL	FR	76.4	N	NO	NO	NO	F211
25454-45	504	500	III-7		BI	RB	BL	FR	54.9	N	NO	NO	NO	F211
61072-114	502	502	III-7	10.64-10.74	BI	RD	SH	FR	85.2	G	NO	NO	NO	
61072-113	502	502	III-7	10.64-10.74	BI	RD	SH	FR	78.1	G	NO	NO	NO	SPIRALLY FRACTURED

6100 0-5	506	502	III -7		BI	R D	PR	CO	10 9.4	G	NO	Y ES	N O	RIGH T, CAPIT ULAR FOSS A AND PART OF SHAF T
6100 1-127	504	504	III -7	10.40- 10.60	BI	SA C	US	FR	82. 4	D	NO	N O	N O	
6103 1-40	504	504	III -7	10.40- 10.60	BI	SC	GN	CO	76. 1	D	NO	N O	N O	UNFU SED
6100 3-6	506	502	III -7		BI	SC	SP	FR	77. 3	D	NO	N O	N O	LEFT
6100 5-131	513	504	III -7		BI	SC	GN	DS	66. 2	D, I	NO	N O	N O	4 FRAG S
6101 1-67	505	502	III -7		BI	SC	GL	FR	78. 6	I	NO	Y ES	N O	
6101 0-20	508	502	III -7		BI	SE D	CO	CO	31. 2	N	NO	N O	N O	
6107 7	504	505	III -7	10.58- 10.68	BI	SE D	CO	CO	33. 9	N	NO	N O	N O	
2545 4-43	504	500	III -7		BI	SE D	CO	CO	32. 9	N	NO	N O	N O	F211
2545 4-52	504	500	III -7		BI	SE D	CO	CO	28. 8	N	NO	N O	N O	
2528 5-29	504	500	III -7		BI	SE D	CO	CO	29. 4	N	NO	N O	N O	
2526 1-5	502	498	III -7		BI	SE D	CO	CO	32. 6	N	NO	N O	N O	
6110 8	504	500	III -7		BI	SE D	CO	CO	27. 8		YE S	N O	N O	FROM F211
6110 6-6	499	499	III -7	10.59- 10.76	BI	SE P	CO	CO	26. 8	N	NO	N O	N O	
6110 6-5	499	499	III -7	10.59- .10.76	BI	SE P	CO	CO	27. 4	N	NO	N O	N O	
6111 3-2	511	506	III -7	10.37	BI	SE P	CO	CO	28. 5	N	YE S	N O	N O	
6110 4-2	499	498	III -7	10.57- 10.72	BI	SE P	CO	CO	28. 8	N	NO	N O	N O	
6101 0-14	508	502	III -7		BI	SE P	CO	CO	30. 2	N	NO	N O	N O	
2531 8-4	510	498	III -7		BI	SE P	CO	CO	30. 3	N	NO	N O	N O	
2528 1-7	510	498	III -7		BI	SE P	CO	CO	36. 7	N	NO	N O	N O	FUSE D SESA MOID S
2545 4-57	504	500	III -7		BI	SE P	CO	CO	26. 7	N	NO	N O	N O	F211
2538 4-8	510	500	III -7		BI	SN	CO	CO	53. 1	D	NO	N O	N O	
6100 1-106	505	503	III -7		BI	SN	CO	CO	51. 9	D	NO	N O	N O	
6105 3-65	502	504	III -7		BI	SN	CO	CO	61	D	NO	N O	N O	
2538 4-13	510	500	III -7		BI	SP	BL	FR	68	G	NO	N O	N O	
2538 4-14	510	500	III -7		BI	SP	BL	FR	43. 5	G	NO	N O	N O	

61026	508	501	III-7		BI	TA	PR	CDL	83.5	D	NO	NO	NO	5 FRAGS
61033-18	502	500	III-7	10.60-10.69	BI	TA	SH	FR	195.8	G	NO	NO	NO	3 FRAGS, SPIRALLY FRACTURED
61076-5	500	496	III-7	10.52-10.72	BI	TA	SH	FR	112.8	I	YES	NO	NO	
61083-5	500	498	III-7	10.65-10.72	BI	TH	NAS	CO	180.9	D	NO	NO	NO	
25384-20	510	500	III-7		BI	TH	AP	CO	64.7	D	NO	NO	NO	UNFUSED
25384-9	510	500	III-7		BI	TH	CN	CO	60.2	D	NO	NO	NO	UNFUSED
61001-114	505	503	III-7		BI	TH	NAS	CR	52.2	D	NO	NO	NO	
61028	509	500	III-7		BI	TH	SP	FR	106.5	D	NO	NO	NO	
61012-105	504	503	III-7		BI	TH	SP	FR	130	D	NO	NO	NO	
61098-46	503	502	III-7	10.63-10.76	BI	TH	SP	FR	75.2	D	NO	NO	NO	
61098-47	503	502	III-7	10.63-10.76	BI	TH	SP	FR	74.2	D	NO	NO	NO	CON 61098-46
61098-48	503	502	III-7	10.63-10.76	BI	TH	SP	FR	57.1	D	NO	NO	NO	
61098-62	503	502	III-7	10.63-10.76	BI	TH	SP	FR	75.6	D	NO	NO	NO	
61015-1	510	502	III-7		BI	TH	SP	FR	54.4	D	NO	NO	NO	
25384-18	510	500	III-7		BI	TH	CNN	FR	50.1	D	NO	NO	NO	
61030-5	502	498	III-7		BI	TH	SP	FR	74.8	D	NO	NO	NO	4 FRAGS
61029-6	509	501	III-7		BI	TH	NAS	LT	69.3	D	NO	NO	NO	UNFUSED, 2 FRAGS
25384-10	510	500	III-7		BI	TH	CN	LT	71.2	D	NO	NO	NO	UNFUSED
1973-022	F5		III-7		BI	TH	CNS	CO	150.3	D	NO	NO	NO	PART OF F5 VERT COLUMN, >10 FRAGS

1973-023	F5		III-7		BI	TH	CN	CO	260	D	NO	NO	NO	PART OF F5 VERT COLUMN, SEVERAL ARTICULATED THORACIC VERTEBRAE CENTRUMS
61011-70	505	502	III-7		BI	TH	SP	FR	52.2	D	NO	YES	NO	
61113-1	511	506	III-7	10.37	BI	TH	CNS	LT	93.8	D	NO	YES	NO	IMPACT FRACTURE
61036	507	503	III-7	10.60-10.68	BI	TH	NAS	FR	58.3	D	NO	NO	NO	>5 FRAGS
61098-53	503	502	III-7	10.63-10.76	BI	TH	SP	FR	111.1	G	NO	NO	NO	
61098-55	503	502	III-7	10.63-10.76	BI	TH	SP	FR	53.3	G	NO	NO	NO	
61098-60	503	502	III-7	10.63-10.76	BI	TH	SP	FR	61.3	G	NO	NO	NO	
61011-70	505	502	III-7		BI	TH	SP	FR	49.2	G	NO	YES	NO	
61004-2	507	502	III-7		BI	TH	SP	FR	101.8	I	NO	NO	NO	
61106-3	499	499	III-7	10.59-10.76	BI	TH	SP	FR	112.9	I	NO	YES	NO	
610011-91	505	502	III-7		BI	TR	CO	CO	63.5	D	NO	NO	NO	
25338-1	506	498	III-7		BI	TRC	CO	CO	72.9	N	NO	NO	NO	RIGHT
61098-57	503	502	III-7	10.63-10.76	BI	UL	SH	DS	122.5	G	NO	NO	NO	
61104-1	499	498	III-7		BI	UN	US	US	34.2		NO	NO	NO	
66418-5	464	518	III-7	9.17	OD	AS	CO	CO	40.1	D	NO	NO	NO	RIGHT
25337-23	504	498	III-7		OD	CL	CO	CO	82.7	N	NO	NO	NO	LEFT
61011-80	505	502	III-7		OD	CPI	CO	CO	21.2	N	NO	NO	NO	LEFT
25384-23	510	500	III-7		OD	CRN	MX	EN	43.2	D	NO	NO	NO	INCLUDES MOLAR, PREMOLAR, INCISOR, >10 FRAGS

61106	499	499	III-7	10.59-10.76	OD	CRN	FN	FR	31.1	D	NO	NO	NO	>10 FRAGS
66635-1	467	512	III-7	9.58-9.85	OD	MR	ML	EN	15.5	D	NO	NO	NO	
66400-52	462	515	III-7	9.16	OD	MR	ML	EN	59.1	D	NO	NO	YES	WHITE PATINA
66400-51	462	515	III-7	9.16-9.35	OD	MR	DRM	US	56.4	D	NO	NO	YES	WHITE PATINA
61065-18	502	501	III-7	10.56-10.66	OD	RB	BL	FR	100.1	D	NO	NO	NO	
25425	502	498	III-7		OD	RB	BL	FR	60.2	D	NO	YES	NO	2 FRAGS
61001-116	505	503	III-7		OD	RB	BL	FR	81	I	NO	NO	NO	
61089-28	501	501	III-7	10.61-10.65	OD	UL	ANC	CO	64.4	I	NO	NO	NO	
1973-016	506	508	III-7/8	10.35	BI	MP	DS	CO	74.1	D	NO	NO	NO	>10 FRAGS
60503-12	510	510	III-7/8	10.11-10.14	BI	RB	PR	CO	53.2	D	YES	NO	NO	>10 FRAGS
25146-Q	5	11	III-8	327 CMBD	BI	CE	SP	FR	98	D	NO	NO	NO	2 FRAGS
25146-Q	5-5.4	11.65-12.00	III-8	327 CMBD	BI	IC	CO	CO	35.6	N	NO	NO	NO	
25158-Q	5.46	9.5	III-8	325 CMBD	BI	LB	FR	US	90.1	G	YES	NO	NO	2 FRAGS
25155-Q	5.11N	14.7	III-8	3.15MBD	BI	MR	ML	CO	55.6	D	YES	NO	NO	BLACK MARKS, POSSIBLY BURNED, RIGHT
25142-Q	5	13	III-8		BI	MR	P4	CO	49.6	D	NO	NO	NO	LEFT, ALSO 6 MR FRAGS
62031	510	501	III-8		BI	MR	M3	EN	80.8	D	NO	NO	NO	RIGHT 4 MAIN FRAGS
25147-Q	5	11	III-8	327 CMBD	BI	MR	P3	EN	108.2	G	NO	NO	NO	LEFT

25146-Q	5-5.4	11.7	III-8	327 CMBD	BI	MR	DRM	FR	64.3	G	NO	YES	NO	2 FRAGS
25146-Q	5-5.4	11.65-12	III-8	327 CMBD	BI	MR	RAM	FR	61.3	G, D	NO	NO	NO	>10 FRAGS
25141-Q	5.8	9.54	III-8	318 CMBD	BI	PHS	CO	CO	57.5	N	NO	NO	NO	RIGHT
62059	504	506	III-8	10.69-10.79	BI	PHS	CO	CO	57.1	N	NO	NO	NO	
25146-Q	5	11	III-8	327 CMBD	BI	PHS	CO	CO	52	N	YES	NO	NO	
25146-Q	5-5.4	11.65-12	III-8	327 CMBD	BI	RB	PR	CO	66.3	D	YES	NO	NO	2 FRAGS
25146-Q	5-5.4	11.65-12	III-8	327 CMBD	BI	RB	PSH	CR	81.2	D	NO	NO	NO	3 FRAGS
25145-Q	5	11	III-8	320 CMBD	BI	RB	BL	FR	173.2	D	NO	NO	NO	
62105-1-2	507	500	III-8	10.68-10.71	BI	RB	PR	CO	37.6	D	NO	NO	NO	2 FRAGS
25142-Q	5	11	III-8		BI	RB	BL	FR	108.3	D, I	NO	NO	NO	8 FRAGS
62084-38	498	499	III-8	10.8-10.94	BI	RB	BL	FR	64.7	G	NO	NO	NO	2 FRAGS
25150-Q	3.3	5.55	III-8	3.10 MBD	BI	RB	BL	FR	55.2	G	NO	NO	NO	SPIRALLY FRACTURED
25151-Q	3.3	5.55	III-8	3.1 MBD	BI	RB	BL	FR	67.2	G	NO	NO	NO	SPIRALLY FRACTURED
62086-31	499	496	III-8	10.72-10.79	BI	RB	BL	FR	92.9	G	NO	YES	NO	
25149-Q	5	3	III-8	3.10 MBD	BI	RB	BL	FR	74.7	G, I	NO	NO	NO	2 FRAGS
25153-Q	515	3.05	III-8	3.13 MBD	BI	RB	BL	FR	88.2	I	NO	NO	NO	
62072-9	501	502	III-8	10.76-10.87	OD	AS	CO	CO	41.9	N	NO	NO	NO	RIGHT
25162-Q	5.58	13.6	III-8	316 CMBD	OD	CRN	MX	P2-M2	48.3	D	YES	NO	NO	TOOTH ROW MINUS M1, LEFT
62079-3	501	503	III-8	10.86-11.05	OD	HM	DS	CO	50.5	G	NO	NO	NO	RIGHT
62048-42	503	502	III-8	10.81-10.93	OD	RB	BL	FR	76.9	D	NO	NO	NO	CARNIVORE GNAWING

62050-10	501	498	III-8	10.82-10.91	OD	RB	BL	FR	57.4	D	NO	NO	NO	
62081-9-14	499	499	III-8	10.76-10.90	OD	RB	BL	FR	57	D	YES	YES	NO	
62086-32	499	496	III-8	10.72-10.79	OD	SEP	CO	CO	13.7	N	NO	NO	NO	
62072-8	501	502	III-8	10.76-10.87	OD	TA	DDS	CO	62	G	NO	NO	NO	RIGHT, CONNECTS TO 62072-10, UNFUSED
62072-10	501	502	III-8	10.76-10.87	OD	TA	DSE	CO	36.3	N	NO	NO	NO	RIGHT, CONNECTS TO 62072-8, UNFUSED
63023-5	511	503	S III-5		BI	PHS	DS	LT	37.4	D	NO	NO	NO	CON 63023-2,3
63023-2	511	503	S III-5		BI	PHS	DS	ME	32.8	D	NO	NO	NO	CON 63023-3,5
63023-3	511	503	S III-5		BI	PHS	PRE	US	42.7	D	NO	NO	NO	CON 63023-2,5
63026-12	509	501	S III-5		BI	UL	DS	CO	66.3	D	NO	YES	NO	2 FRAGS
63015-121-123	509	503	S III-5		OD	PHF	DS	LT	18.7	D	NO	NO	NO	3 FRAGS
63015-120	509	503	S III-5		OD	SEP	CO	CO	13.4	N	NO	NO	NO	
60812-6	412	366	x1 III-5	9.75	OD	MR	ML	EN	18.4	D	NO	NO	NO	>10 FRAGS
60812-6	412	366	x1 III-5	9.75	OD	MR	EN	FR	18.3	D	NO	NO	NO	>10 FRAGS
60812-6	412	366	x1 III-5	9.75	UN	TFR	EN	EN	28.9	D	YES	NO	NO	HIGHLY DETERIORATED, >10 FRAGS
60418-1					BI	CB	US	US	51.9	D	YES	NO	NO	CANCELLOUS BONE

60810-1					BI	CE	CNN	CO	116.7	D	NO	NO	NO	CNN AND >10 FRAGS
25271-16					BI	CRN	SKO	FR	41.5	D	NO	NO	NO	
25271-11					BI	CRN	SKO	FR	52.1	D	NO	NO	NO	
25271-15					BI	FL	US	US	46.7	G	NO	NO	NO	SPIRALLY FRACTURED
25271-4					BI	FL	US	US	89.4	I	NO	NO	NO	
61064-24					BI	HM	FK	LT	98.7	G	NO	NO	NO	
25266-2					BI	LB	SH	FR	35.2	G	NO	NO	NO	SPIRALLY FRACTURED
25140-Q					BI	LB	FR	US	80.1	G	NO	NO	NO	2 FRAGS
60406-20					BI	MP	DS	US	35.2	D	NO	NO	NO	HALF OF ARTICULAR SURFACE, 2 FRAGS
63021-25					BI	MR	ML	CO	48.7	D	NO	NO	NO	6 FRAGS
61083-3					BI	MR	HY	CO	116.8	D	NO	YES	NO	
25157-Q					BI	MR	SYM	BUCCAL	80.2	G	NO	NO	NO	LEFT, 2 FRAGS, IMPACT FRACTURES, SPIRALLY FRACTURED
25271-9					BI	MR	DRM	FR	71.9	G	NO	NO	NO	SPIRALLY FRACTURED
25271-13					BI	MR	DRM	FR	94.7	I	NO	NO	NO	
60407-9					BI	PHF	PR	ME	41.1	D	NO	NO	NO	

60407-10					BI	PHS	DS	CO	35.3	D	NO	NO	NO	
60420-3					BI	PHS	DS	LT	34.6	D	NO	NO	NO	
63097-26	508	507			BI	PHT	US	US	51.7	D	NO	NO	NO	5 FRAGS, LATERAL + PROXIMAL
60507-31					BI	RB	PR	CO	56.9	D	YES	NO	NO	>10 FRAGS
25271					BI	RB	TU	CO	29.7	D	NO	NO	NO	
63049-2					BI	RB	BL	FR	123.2	D	NO	NO	NO	
1973-003					BI	RB	BL	FR	77.6	D	NO	NO	NO	>10 FRAGS
25266-3					BI	RB	BL	CO	407	D	NO	YES	NO	
62085-5,6					BI	RB	BL	FR	94.8	G	NO	NO	NO	
62044-8					BI	RB	BL	FR	91.1	G	NO	NO	NO	
61115-1					BI	RB	BL	FR	70.4	G	NO	YES	NO	
25271-6					BI	RB	BL	FR	61.3	I	NO	NO	NO	2 FRAGS
25112-Q-1973-009					BI	RB	PSH	CO	97.8	I, D	YES	NO	NO	7 FRAGS
1973-004					BI	RD	PR	CD	60.5	D	NO	NO	NO	RIGHT
25112-Q-1973-009					BI	RD	SH	FR	80.1	G	NO	NO	NO	
1973-001	492	512		10.25	BI	SAC	VN	FR	100.6	D	NO	NO	NO	>10 FRAGS
25271-14					BI	SEP	CO	CO	29.4	N	NO	NO	NO	
1973-002					BI	SN	CO	CO	77.2	D	NO	NO	NO	>10 FRAGS
25271					BI	TH	NA	FR	51.6	D	NO	NO	NO	
60504-29					BI	UL	ANC	CO	82.3	G, D	NO	NO	NO	>10 FRAGS
25112-Q-1973-008					BI	UL	OLC	FR	69.9	I	NO	NO	NO	
60505-14					OD	AS	CO	CO	44	D	NO	NO	NO	RIGHT
60400-4					OD	CPU	CO	CO	25.4	D	NO	NO	NO	LEFT
60425-5					OD	CRN	MX	ML	44.2	D	NO	NO	NO	

6050 7-33					O D	CR N	MX	P2-P4	57	D	NO	N O	N O	LEFT
1973- 015					O D	M R	TW	CO	41. 8	D	NO	N O	N O	MISSI NG M1 MOL AR, RIGH T
6042 7-8					O D	M R	PM L	CO	18. 2	D	NO	N O	N O	
6043 9-2					O D	PH F	CO	CO	47. 1	D	NO	N O	N O	
6050 5-94					O D	PH F	CO	CO	41. 9	D	NO	N O	N O	
6050 5-92					O D	PH S	CO	CO	32. 6	D	NO	N O	N O	
6050 5-93					O D	PH S	CO	CO	32	D	NO	N O	N O	
6051 7-9					O D	PH S	PR	CO	30. 3	D	NO	N O	N O	
6051 2-7					O D	PH S	PR	CO	19. 2	D	NO	N O	N O	
6040 4-22					O D	PH S	PR	CO	27. 2	D	NO	N O	N O	
6052 2-2					O D	RB	PR	HEAD	27. 1	D	NO	N O	N O	
6040 4-21					O D	SC	GN	CO	41. 1	D	YE S	N O	N O	RIGH T

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